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FOREST PRODUCTS LAB MADISON WIS  
PARVCOST: A PARTICLEBOARD VARIABLE COST PROGRAM.(U)  
1977 P J INCE, G B HARPOLE  
FS6TR-FPL-14

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USDA FOREST SERVICE  
GENERAL TECHNICAL REPORT  
✓FPL-14  
1977

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## ABSTRACT

PARVCOST, A FORTRAN program, was designed to develop economic and financial analyses of systems for manufacturing particleboard. In the program, costs and requirements of wood are calculated as are chemicals and energy per unit of finished board products. Estimates are made of sensitivity of the finished product costs to changes in unit costs of energy and raw materials. Weight statistics are computed for the finished product and for the profit contribution ratio for values of given products. An appendix is included with a sample program output, two versions of data decks and modifications, notes on use of the two versions, and a listing of the program and documentation cards.

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# PARVCOST: A PARTICLEBOARD VARIABLE COST PROGRAM

By

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9  
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U.S. Department of Agriculture

11 1977

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## INTRODUCTION

A computer program for the variable cost of particleboard, PARVCOST, was developed by the Marketing and Economics Analysis Research Work Unit of the Forest Products Laboratory (FPL). The objective was to automate the computations of raw material and energy unit cost, board statistics, and energy requirements for particleboard manufacture from estimates of material costs and energy requirements. Many of the basic concepts used in PARVCOST were adapted from a computer program developed by G. A. Koenigshof, USDA, Forest Service, Athens, Ga., to evaluate veneered particleboard

manufacturing systems.

PARVCOST is written in FORTRAN and can be run on a UNIVAC 1110 (Univ. of Wis.), a CDC 6500 (Purdue Univ.), and a DATACRAFT 6024/3 (FPL).

Appended to this report are the following: A sample program output; a listing of a long (documented) version data deck; a sample of a short version data deck; two program cards needed for modification of the two versions; notes on use of the two versions; and a listing of the PARVCOST program and documentation cards.

## COMPUTATIONS

PARVCOST calculates costs and requirements of wood, chemicals, and energy per unit of finished board product. It estimates sensitivity of costs of finished products to changes in costs of units of energy and raw materials. It also computes weight statistics for the finished product and the profit contribution ratio for given product values.

### Raw Materials, Energy, and Costs

PARVCOST computes input requirements for raw material and energy and variable costs of particleboard manufacture in standard units of finished product output ( $\text{Mft}^2\text{-}3/8\text{ in.}$ ,  $\text{Mft}^2\text{-}1/2\text{-in.}$ ,  $\text{m}^3$ ). Computational outputs of PARVCOST (appendix A) are derived from estimates of process and supply re-

quirements.

Gross input requirements per unit of output for particleboard manufacture are always greater than the final amount of raw materials that physically appear in a unit of the finished product. This is caused by fines, trims, and other processing material and energy losses. The phrase "per unit of output" in this program refers to the gross input requirements per unit of finished board product. Variable costs of production are calculated as gross input requirements per unit of product multiplied by estimated price for given raw material and energy input.

<sup>1/</sup> The Laboratory is maintained in cooperation with the University of Wisconsin-Madison.

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If an external fuel, in addition to residues fuels, is needed, PARVCOST selects the least expensive alternative fuel—wood, oil, gas, or coal—on the basis of cost per effective heating value. Energy requirements and costs are computed in terms of the least expensive fuel available.

### **Sensitivity of Unit Variable Costs**

Another objective of PARVCOST is to gage the sensitivity of total gross variable cost to possible changes in individual market costs of raw material (wood, resin, and wax) and energy (electricity and fuel). Sensitivity of total gross variable cost to the cost for each of these is given in the PARVCOST printed output in terms of total gross variable cost per cubic foot of finished product. Sensitivity is expressed as simple linear equations of the form,

$$Y = AX + B$$

where

**Y** is total gross variable cost per cubic foot of panel product;

**A**, a "slope" coefficient calculated by the program;

**X**, an individual item cost on an input basis (wood cost in \$/ft<sup>3</sup>, price of oil in \$/barrel); and

**B**, a constant term calculated by the program.

Sensitivity equations provide for determining the effect that changes in input prices for raw materials will have on total gross variable cost per cubic foot of finished

product. If there is a change in the cost of one raw material, the new total gross variable cost can be calculated by simply applying a sensitivity equation to the new cost of that raw material.

The effect of any magnitude of change in cost of wood raw material, resin, wax, or electricity can be evaluated using the appropriate sensitivity equation. Gross variable cost is a strictly linear function of cost of wood, resin, wax, and electricity for any value of these individual costs. However, only the effect of marginal changes in fuel costs can be evaluated by the sensitivity to the fuel-cost formula. PARVCOST always selects the least expensive fuel on the basis of cost per effective British thermal unit. Large changes in fuel cost may result in substituting one fuel for another.

### **Profit Contribution Ratio**

PARVCOST calculates a profit contribution ratio. Profit contribution is the net sales value plus any benefits from the sale of surplus residues minus variable costs of production. The profit contribution ratio is the ratio of the profit contribution to the net sales value, which expresses the percent of revenues available to cover other operating costs and yield profits. The PARVCOST profit contribution ratio can be used to gage the relative feasibility of manufacturing particleboard between sites where raw materials, energy, and product outputs have different values, but other operating costs may be assumed equal.

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## **DATA REQUIREMENTS OF OF PARVCOST PROGRAM**

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Data required by PARVCOST consist of estimates of the following factors: (1) Specific gravity and moisture content of wood, bark, and pressed panel, (2) cost of procuring wood, chemicals, residues, fuel, electricity, (3) costs of finished board product, (4) ratio of bark to wood in roundwood, (5) percents of process residues loss and the width of edging trims, (6) finished panel size, (7) percent face and core furnish, (8) weight percentages of chemicals needed in face and core furnish, (9) British thermal unit value of fines, trims, bark, and fuel, and (10) requirements of heat

energy (Btu) and electricity (kWh) per cubic foot of output.

Of a total of 48 input variables, each must be assigned a value. Forty-two are estimates of various particleboard manufacturing factors; five are simple integer option variables that control the format of the printed program output; and one is the title of the printed output. Following is a listing of the 48 input variables required by PARVCOST. The variables are in the order in which they occur in the data deck. The four-letter program name of each variable precedes each definition.

## INPUT VARIABLES

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1. **CCUF**, cost of wood raw material in dollars per cubic foot (solid volume).
2. **SGRW**, oven-dry specific gravity of wood raw material (average value, green volume, and dry weight).
3. **GRMC**, moisture content on an oven-dry basis of wood raw material (as a decimal).
4. **PCTB**, ratio of bark to wood in wood raw material (this ratio is on a weight basis and refers only to the bark that is removed and used as fuel).
5. **WBMC**, moisture content on an oven-dry basis of bark (as a decimal).
6. **SGBK**, oven-dry specific gravity of bark (average value, green volume, and dry weight).
7. **CRES**, cost of resin in dollars per pound of resin.
8. **PRRF**, weight percent of face blend required to be resin (as a decimal).
9. **PRRC**, weight percent of core blend required to be resin (as a decimal).
10. **CWAX**, cost of wax in dollars per pound of wax.
11. **PWRF**, weight percent of face blend required to be wax (as a decimal).
12. **PWRC**, weight percent of core blend required to be wax (as a decimal).
13. **ODMC**, oven-dry basis moisture content of wood coming out of dryer (as a decimal).
14. **PCTF**, weight percent of furnish material lost as dry fines but mostly recoverable as fines fuel (as a decimal).
15. **PCFF**, weight percent of product that is face furnish (as a decimal).
16. **PCCF**, weight percent of product that is core furnish (as a decimal).
17. **ODWP**, weight in pounds per solid cubic foot of finished product.
18. **FPMC**, oven-dry basis moisture content of wood in finished product (as a decimal).
19. **PTLG**, width in inches of panel trims cut away along length of product.
20. **PTWD**, width in inches of panel trims cut away along width of product.
21. **PWSR**, weight percent of wood raw material that becomes green (wet screened) wood residue.
22. **CORM**, f.o.b.—mill value of any surplus residues (residue mix) in dollars per pound.
23. **CKWH**, cost of electricity in dollars per kilowatt-hour.
24. **BTUF**, average higher heating value of nonbark wood fuel residues in million British thermal units per pound.
25. **BTUB**, average higher heating value of bark residues in million British thermal units per pound.
26. **BTBD**, million British thermal units required at boiler or other heat recovery device per pound of water evaporated by wood dryer.
27. **BTBP**, million British thermal units required at boiler for press steam per cubic foot cut panel product.
28. **BTBT**, million British thermal units required at boiler for thaw pond per cubic foot cut panel product.
29. **BTBH**, million British thermal units required at boiler for heating per cubic foot cut panel product.
30. **BTBM**, million British thermal units required at boiler for miscellaneous purposes per cubic foot cut panel product.
31. **RKWH**, kilowatt-hours of electricity required per cubic foot of cut panel product.
32. **PPWD**, width of pressed panel in inches (trimmed dimension).
33. **PPLG**, length of pressed panel in inches (trimmed dimension).
34. **SALE**, net sales value f.o.b. mill of product in dollars per solid cubic foot.
35. **PGAS**, price of natural gas in dollars per thousand cubic foot.
36. **POIL**, price of fuel oil in dollars per barrel.
37. **PWOD**, price of external (nonprocess residue) wood fuel in dollars per ton.
38. **PCOL**, price of coal in dollars per ton.
39. **BTUG**, million British thermal units per thousand cubic foot of natural gas.
40. **BTUO**, million British thermal units per barrel of oil.
41. **BTUW**, million British thermal units per ton of wood fuel.
42. **BTUC**, million British thermal units per ton of coal.
43. **ITOP**, coded specification of how trims are to be handled (0 = trims recycled as furnish; 1 = trims used as fuel).
44. **IOP1**, coded specification of size of panel for which data should be printed in second data column of data printout (0 (or blank) for 3/8 in., 1 for 1/4 in., 2 for 3/4 in., 3 for 5/8 in., and 4 for 1/2 in.).



45. **IOP2**, coded specification of size of panel for which data should be printed in third data column of data printout (0 (or blank) for 1/2 in., 1 for 1/4 in., 2 for 3/4 in., 3 for 5/8 in., and 4 for cubic meter).  
46. **NOPT**, coded specification of number of

data columns to be printed on printed output (3 for 3 columns, 0 (or blank) for 5 columns).  
47. **NCOP**, specification of number of copies of output to be printed (01 to 10).  
48. **TITL**, an alphanumeric array for input of title of printed output.

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## STRUCTURE OF DATA DECK

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The PARVCOST data deck has two versions: A long, documented version (DV) (appendix B) and a short, not documented version (SV) for which a sample is given in appendix C. Either version may be used for entering

data into the PARVCOST program. The two versions enter exactly the same data in the same order. The only difference between the two versions is that only the long version contains documentation of each input variable.

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## LONG VERSION DATA DECK

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The DV data deck (appendix B) has 104 lines. Most of the DV data deck is documentation that explains the data-coding sequence; it does not influence the function of the program. The documentation in the DV data deck is essential if the deck is stored in a computing facility, communication is established via a teletype terminal or similar device, and stored data is to be edited line-by-line. A list of the DV data deck can also be used as a coding guide reference if using the SV data deck.

In using the DV data deck, data to be entered is shown in appendix B and follows "WOOD RAW MATERIAL COST PER CUBIC FOOT." The numerical information is given that should be entered in columns 6 through 18; each datum must include a decimal point.

Program controls are entered as integer data without decimal points in columns 1 and 2 (as indicated) on the five data cards preceding the program title cards (last cards in data deck). Alphanumeric (title of output) data are entered on the last two cards of the data deck. All of the other data columns and documentation comments of the DV data deck are nonfunctional.

Use of the DV data deck requires that program card 6 be replaced by card 6B (appendix D). Thus, if using the DV data deck, remove main program card number 6 and insert card number 6B in the same place in the main program. The program will not run with the DV data deck unless this modification has been made.

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## SHORT VERSION DATA DECK FORMAT

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The SV data deck consists of 10 data cards. Forty-eight input variables are entered on 10 cards in the same order listed in the long version section on data requirements. If using the SV deck, all of the required statistics of particleboard manufacture (the first 42 input

variables) are entered on cards 1 to 6 (table 1). Program control specifications (input variables 43-47) are entered on card 7. The title of the output is entered on cards 8 through 10.

**Cards 1 through 6, instructions:** The estimates for the first 42 input variables are



entered on the first six cards of the SV data deck. Seven estimates are entered on each card. One estimate is punched in every 10 spaces starting in columns 1 through 10 of each card. Each estimate that is punched must

include a decimal point. An estimate may be punched anywhere in the 10-space field allotted to each variable. Input variables for cards 1 through 6 and the columns for their entry are listed in table 1.

Table 1.—Input variables for cards 1 through 6

Card. No.	Columns						
	1-10	11-20	21-30	31-40	41-50	51-60	61-70
1	CCUF	SGRW	GRMC	PCTB	WBMG	SGBK	CRES
2	PRRF	PRRC	CWAX	PWRF	PWRC	ODMC	PCTF
3	PCFF	PCCF	ODWP	FPMC	PTLG	PTWD	PWSR
4	CORM	CKWH	BTUF	BTUB	BTRD	BTRP	BTRT
5	BTRH	BTRM	RKWH	PPWD	PPLG	SALE	PGAS
6	POIL	PWOD	PCOL	BTUG	BTUO	BTUW	BTUC

**Card 7, instructions:** input variables 43 through 47 are specified on card 7. The single integer specifications for ITOP, IOP1, IOP2, and NOPT are punched in columns 1 through 4, respectively. The two integer specifications for NCOP are punched in columns 5 and 6. The appropriate integers to punch in these columns are discussed in the listing of input variables in the various section on data requirements for the PARVCOST program.

**Cards 8 through 10, instructions:** The title desired to be printed at the top of the program

output is punched on cards 8 through 10 of the SV data deck. The title should be typed on the center of these cards.

Appendix B is a listing of a sample SV data deck. Note that it contains the same data as the sample listing of the DV version in appendix A. If the SV version of the data deck is used, program card 6 (not 6B, see appendix D) must be in the program deck. The program will not run with the SV data deck unless program card 6 is in the program deck and card 6B has been removed.

# APPENDIX A.—Sample Program Output Obtained by Running PARVCOST with Sample Data from Appendixes B or C

MATERIAL AND RESOURCE REQUIREMENTS, BOARD STATS. AND VARIABLE COSTS FOR MANUFACTURE OF STRUCTURAL PARTICLEBOARD PER UNIT OF OUTPUT (HYPOTHETICAL TEST)

NET SALES VALUE	\$/CU.-FT. \$ 2.4760	\$/MSF 3/8 IN. BASIS \$ 93.000	1/2 IN. BASIS \$ 124.000	5/8 IN. BASIS \$ 155.000	\$/CU.-METER \$ 105.083
VARIABLE COSTS OF PRODUCTION					
WOOD (\$ .2800/CU. FT.)	\$ .2859	\$ 8.936	\$ 11.914	\$ 14.893	\$ 10.097
RESIN ( 6.5%, \$ .39/LB.)	.9004	28.150	37.533	46.917	31.807
WAX ( 1.0%, \$ .12/LB.)	.0438	1.368	1.823	2.279	1.545
ELECTRIC POWER (\$ .020/KWH)	.1200	3.750	5.000	6.250	4.237
DRYER HEAT(FUEL=\$ .206/MM BTU)	.0112	.351	.468	.585	.396
PROC.-STEAM(FUEL=\$ .206/MM BTU)	.0095	.298	.398	.497	.337
LESS RESIDUE VAL.(\$ .48.00/800)	.0000	.000	.000	.000	.000
GROSS VARIABLE COST	\$ 1.3713	\$ 42.853	\$ 57.137	\$ 71.421	\$ 48.420
PROFIT CONTRIBUTION	\$ 1.1047	\$ 50.147	\$ 66.863	\$ 83.579	\$ 56.662
P. C. RATIO	53.9%				

SENSITIVITY OF GROSS VARIABLE COST PER CU. FT. OF FINISHED PRODUCT OUTPUT

VAR. COST/CU. FT. = 1.0212 \* (WOOD COST/CU. FT.) + 1.0853  
VAR. COST/CU. FT. = 2.3705 \* (RESIN COST/LB.) + .4705  
VAR. COST/CU. FT. = .7647 \* (WAX COST/LB.) + 1.3275  
VAR. COST/CU. FT. = 6.0000 \* (ELECTRICITY COST/KWH) + 1.2513  
VAR. COST/CU. FT. = .0005 \* (PRICE OF COAL/TON) + 1.3624  
VAR. COST/CU. FT. = .0133 \* (PRICE OF NAT. GAS/MCF) + 1.3594

BOARD STATISTICS	LBS./CU.-FT.	LBS./MSF 3/8 IN. BASIS	1/2 IN. BASIS	5/8 IN. BASIS	LBS./CU.-METER
GROSS BOARD WEIGHT	38.150	1192.187	1509.585	1906.979	1347.076
WEIGHT OF WATER( 9.0% M.C.)	3.150	98.437	131.250	164.062	111.226
OVEN DRY WGT. OF BOARD	35.000	1093.750	1458.334	1822.917	1235.850
WGT. OF RESINS( 6.5% SOLIDS)	2.275	71.094	94.792	118.490	80.330
WGT. OF WAX( 1.0% SOLIDS)	.350	10.937	14.583	18.229	12.358
WEIGHT OF WOOD	32.375	1011.719	1348.959	1686.198	1143.161
RAW MATERIAL REQUIREMENTS					
WOOD (O. D. SPEC. GRAV. = .59)	REQ./CU.-FT.	REQ./MSF 3/8 IN. BASIS	1/2 IN. BASIS	5/8 IN. BASIS	REQ./CU.-METER
POUNDS OF O.D. WOOD	37.757	1179.907	1573.210	1966.511	1333.200
POUNDS OF GREEN WOOD	67.963	2123.632	2831.778	3539.720	2399.760
CU. FT. OF ROUND WOOD	1.021	31.914	42.551	53.189	36.060
RESIN (LBS. SOLIDS/LIQUID)	2.371	74.079	98.772	123.465	83.703
WAX (LBS. SOLIDS)	.365	11.397	15.196	18.995	12.677

FUEL AND POWER STATISTICS IN MILLION B.T.U.'S					
	BTUS/CU.FT.	BTUS/MSF	3/8 IN. BASIS	1/2 IN. BASIS	5/8 IN. BASIS
FUEL REQUIREMENTS					
DRYER HEAT					
(-.001700BTUS/LB. WATER EVAP.)	.047498	1.484323	1.979098	2.473871	1.677166
PROCESS STEAM					
PRESS	.019200	.600000	.800001	1.000000	.677952
THAW POND	.002000	.062500	.083333	.104167	.070620
HEATING	.016000	.500000	.666667	.833333	.564960
MISCELLANEOUS	.003200	.100000	.133333	.166667	.112992
TOTAL FUEL REQUIRED	.087898	2.746823	3.682433	4.578037	3.103690
WOOD FUEL GENERATED					
DRY FINES/TRIMS (.8.0% 2.0%)	.023277	.727416	.969489	1.212360	.821922
NET BARK (.12:1 RATIO OF 20:1)	.031196	.974865	1.299821	1.624775	1.101519
SCREENED NET WOOD RESIDUES	.010886	.340184	.433579	.566974	.384381
TOTAL FUEL GENERATED	.065359	2.042465	2.723289	3.404109	2.307822
AUXILIARY FUEL BTU	.011534	.360435	.480580	.600725	.407263
NET FUEL REQUIREMENT	.011006	.343922	.458563	.573204	.388605
FUEL AND POWER REQUIRED					
REQ./CU.FT.	REQ./MSF	3/8 IN. BASIS	1/2 IN. BASIS	5/8 IN. BASIS	REQ./CU.METER
KWH. ELECT. POWER (\$.020/KWH)	6.0000	187.500	250.000	312.500	211.860
TONS COAL (\$ 18.00/TON)	.000491	.015354	.020472	.025589	.017348
MCF. AUX. GAS (\$ .90/MCF.)	.013257	.414293	.552391	.690489	.468118



## APPENDIX B.—Listing of Long, or Documented, Version Data Deck

THIS THE DOCUMENTED VERSION OF THE PANVCOST DATA DECK  
COLUMN WIDTHS

6X	18X	30X
WOOD RAW MATERIAL COST PER CUBIC FOOT		
CCUF= .28		
O. D. SPECIFIC GRAVITY OF THE WOOD RAW MATERIAL		
SGRW= 0.59295		
MOISTURE CONTENT O. D. BASIS OF THE GREEN WOOD RAW MATERIAL		
GRMC= .80		
RATIO OF BARK TO WOOD IN WOOD RAW MATERIAL		
PCTB= .12		
MOISTURE CONTENT O. D. BASIS OF GREEN BARK MATERIAL		
WBMC= 1.00		
O. D. SPECIFIC GRAVITY OF THE BARK		
SGBK= 0.700		
COST OF RESIN PER POUND IS		
CRES= .38		
PERCENT RESIN REQUIRED IN FACE IS		
PRRF= .07		
PERCENT RESIN REQUIRED IN CORE IS		
PRRC= .05		
COST OF WAX PER POUND OF WAX IS		
CWAX= .12		
PERCENT OF WAX REQUIRED IN FACE IS		
PWRF= .01		
PERCENT OF WAX REQUIRED IN CORE IS		
PWRC= .01		
MOIST. CONTENT WOOD OUT OF DRYER		
ODMC= .06		
THE RECOVERABLE PERCENT OF FINES LOSS (WEIGHT PERCENT OF WOOD RAW MATERIAL)		
PCTF= .08		
PERCENT OF PRODUCT IN FACE FURNISH		
PCFF= .75		
PERCENT OF PRODUCT IN CORE FURNISH		
PCCF= .25		
O.D. WT. OF PRESSED PANEL/CU.FT.		
ODWP= 35.0		
MOIST. CONTENT OF WOOD IN PRODUCT		
FPMC= .09		
PANEL TRIMS ALONG LENGTH (INCHES)		
PTLG= 1.5		
PANEL TRIMS ALONG WIDTH (INCHES)		
PTWD= 1.5		
PERCENT OF WOOD RAW MATERIAL LOST AS GREEN RESIDUE, (RECOVERED AS FUEL)		
PWSR= 0.05		
VALUE F.O.B.--MILL PROCESS GENERATED WOOD AND BARK RESIDUES (AVERAGES/POUND)		
CODR= 0.000		
COST OF ELECTRICITY PER KWH.		
CKWH= .020		
BTU IN WOOD FINES AND RESIDUES (MILLION BTU/LB. O.D. HIGHER HEATING VALUE)		
BTUF= .008500		
BTU IN BARK (MILLION BTU/LB. O.D. HIGHER HEATING VALUE)		
BTUB= .009500		
DRYER BTU DEMAND AT BOILER--MILLION BTU/LB. WATER EVAPORATED		
BTRD= .001700		
PROC. STEAM PRESS BTU DEMAND AT BOILER--MILL. BTU/CU. FT. PANELS		
BTRP= .019200		
THAW POND STEAM BTU DEMAND AT BOILER--MILL. BTU/CU. FT. PANELS		
BTRT= 0.002000		
HEATING STEAM BTU DEMAND AT BOILER--MILL. BTU/CU. FT. PANELS		
BTRH= .016000		
MISCELLANEOUS STEAM BTU DEMAND AT BOILER--MILL. BTU/CU. FT. PANELS		
BTRM= .003200		
ELECTRIC USAGE--KWH./CU. FT. PANELS		
RKWH= 6.000		
PRESSED PANEL WIDTH (INCHES)		
PPWD= 48.0		
PRESSED PANEL LENGTH (INCHES)		
PPLG= 96.0		
THE NET SALES VALUE (\$/CU. FT.)		
SALE= 2.976		
AVERAGE ANTICIPATED PRICE OF NATURAL GAS PER MCF		
PGAS= 0.90		

AVERAGE ANTICIPATED PRICE OF OIL PER BARREL  
 POIL= 9.00  
 AVERAGE ANTICIPATED PRICE OF WOOD TO BE USED AS FUEL PER TON  
 PWOD=17.00  
 AVERAGE ANTICIPATED PRICE OF COAL PER TON  
 PCOL= 18.0  
 MILLION BTUS AVAILABLE PER MCF OF NATURAL GAS  
 BTUG= 1.00  
 MILLION BTUS AVAILABLE PER BARREL OF OIL  
 BTUO= 5.00  
 MILLION BTUS AVAILABLE PER TON OF WOOD  
 BTUM= 18.0  
 MILLION BTUS AVAILABLE PER TON OF COAL  
 BTUC= 28.0  
 LEAVE NEXT LINE BLANK IF TRIMS ARE RECYCLED AS FURNISH, 1 IN COL. 1 IF AS FUEL  
  
 ON THE FOLLOWING LINE SPECIFY IOP1, THE TYPE OF OUTPUT IN COLUMN 2, SPECIFY  
 1 FOR 1/4 IN., 2 FOR 3/4 IN., 3 FOR 5/8 IN., 4 FOR 1/2 IN., DEFAULT (0) IS 3/8 IN.  
 0  
 ON THE FOLLOWING LINE SPECIFY IOP2, THE TYPE OF OUTPUT IN COLUMN 3, SPECIFY  
 1 FOR 1/4 IN., 2 FOR 3/4 IN., 3 FOR 5/8 IN., 4 FOR CU.METER, DEFAULT (0) IS 1/2 IN.  
 0  
 ON THE NEXT LINE SPECIFY THE NUMBER OF COLUMNS OF DATA OUTPUT TO BE PRINTED  
 SPECIFY 3 FOR 3 COLUMN WIDTH, DEFAULT (0) IS 5 COLUMN WIDTH  
 0  
 ON THE FOLLOWING LINE SPECIFY NCOP, THE NUMBER OF COPIES (01 TO 10)  
 01  
 CENTER THE TITLE ON THE NEXT THREE LINES  
 MATERIAL AND RESOURCE REQUIREMENTS, BOARD STATS. AND VARIABLE COSTS FOR MAN-  
 UFACTURE OF STRUCTURAL PARTICLEBOARD PER UNIT OF OUTPUT (HYPOTHETICAL TEST)

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### APPENDIX C.—Sample of Short Version Data Deck

**Data and cards of the short version data deck:** The same sample data presented for the documented version sample in appendix A are

presented here as they would be entered in the data deck for the short version.

MANUFACTURE OF STRUCTURAL PARTICLEBOARD PER UNIT OF OUTPUT (HYPOTHETICAL TEST)						
MATERIAL AND RESOURCE REQUIREMENTS, BOARD STATS. AND VARIABLE COSTS FOR MAN-						
00001						
9.00	27.0	18.0	1.00	5.00	18.0	28.0
.016000	.003200	6.000	96.0	288.0	2.976	0.90
0.02	.020	.003500	.009500	.001700	.019200	0.002000
.75	.25	35.0	.09	1.5	1.3	0.05
.07	.05	.12	.01	.01	.06	.03
.28	0.5925	.80	.12	1.00	0.700	.38



### APPENDIX D.—Program Cards 6 and 6B

[illegible]

Program card 6, to be used with the short version data deck:

[illegible]

Program card 6B, for the long, documented version data deck:

## APPENDIX E.—Notes on Use of Program

### *Calculation of Fuel Statistics*

PARVCOST uses the data input prices and heating values of the four types of external fuel—wood, coal, oil, and natural gas—to select the most economical fuel. It may become desirable to exclude one or more of these fuels from consideration (for example, natural gas may be excluded as a potential fuel if supplies are interruptible). Any one of the four fuels can be excluded as a fuel by inputting an imaginary high price for that fuel, because PARVCOST considers only the least expensive fuel. However, an accurate cost for procuring either oil or natural gas should always be entered in the data deck. The reason is oil or natural gas will be needed as an auxiliary fuel for wood residues, bark, and external wood fuel. The program calculates the cost of auxiliary fuel on the basis of the cost of oil or natural gas, whichever is cheapest per effective British thermal unit.

The price of fuel as given in the output (in dollars per million effective Btu's) is a weighted average that includes the cost of auxiliary fuel and the reduction in costs attributable to using process residue fuel. If process residues are sufficient to supply the energy requirement, fuel price is simply the price of auxiliary fuel per million effective British thermal units from residues and auxiliary fuel.

PARVCOST includes subroutines that calculate the effective heating value of fuels. All data for heating value entered in the data deck should be the "higher heating" value,

which is the maximum heat released by combustion of dry fuel determined in a bomb calorimeter. This is the most common method of reporting the heating value of fuels.

### *Internal Program Assumptions*

Several process variables are assigned fixed values within the PARVCOST program. These variables include the following:

PERM, the percent of nonrenewable fines loss, which is assigned a value of 3 percent in statement number 78;

FACT, the weight in pounds of a bone-dry unit of process residues mix, which is assigned a value of 2,400 in statement number 182;

AUXF, the percent of process requirement of British thermal units that must be supplied by auxiliary fuel for wood or residues fuel, which is assigned a value of 5 percent in statement number 109;

T1, the ambient temperature of fuel and air for combustion of residue fuels in degrees Fahrenheit, which is assigned a value of 68 in statement number 8 of subroutine SUB1;

T2, the stack gas temperature for combustion of residue fuels in degrees Fahrenheit, which is assigned a value of 400 in statement number 9 of subroutine SUB1; and

PCTR, the percent excess air in combustion of residue fuels, which is assigned a value of 40 percent in statement number 7 of subroutine SUB1.

If it is necessary to change any of these fixed assumptions, the program statements must be changed.

PARTICLEBOARD VARIABLE COST PROGRAM: PARVCOST

BY

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MARCH, 1977

PARVCOST IS A FORTRAN PROGRAM DESIGNED TO ASSIST DEVELOPMENT OF ECONOMIC AND FINANCIAL ANALYSIS OF PARTICLEBOARD MANUFACTURING SYSTEMS. PARVCOST CALCULATES COSTS AND REQUIREMENTS OF WOOD, CHEMICALS AND ENERGY PER UNIT OF FINISHED BOARD PRODUCT. IT ESTIMATES SENSITIVITY OF FINISHED PRODUCT COSTS TO CHANGES IN UNIT COSTS OF ENERGY AND RAW MATERIALS. IT ALSO COMPUTES WEIGHT STATISTICS FOR THE FINISHED PRODUCT AND THE PROFIT CONTRIBUTION RATIO FOR GIVEN PRODUCT VALUES.

PARVCOST PROGRAM INPUT REQUIRES ESTIMATES OF (1) SPECIFIC GRAVITY AND MOISTURE CONTENT OF WOOD, BARK AND PRESSED PANEL, (2) MARKET PRICES OF WOOD, CHEMICALS, RESIDUES, BARK, FUEL, ELECTRICITY AND THE FINISHED BOARD PRODUCT, (3) RATIO OF BARK TO WOOD IN ROUNDWOOD, (4) PROCESS FINES LOSS PERCENT AND WIDTH OF EDGING TRIMS, (5) FINISHED PANEL SIZE, PERCENT FACE AND CORE FURNISH, AND PERCENTAGES OF CHEMICALS NEEDED IN FURNISH, (6) B.T.U. VALUE OF RESIDUES, BARK AND FUEL, (7) B.T.U. REQUIREMENTS PER CUBIC FOOT OF OUTPUT FOR PROCESS STEAM AND ALSO ELECTRICITY REQUIREMENTS.

KEY TERMS

\* \* \* \*

PER UNIT OF OUTPUT \*\*\* (PER UNIT OF PRODUCT, PER CUBIC FOOT CUT PANELS, OR PER CUBIC FOOT OF CUT PANEL PRODUCT) EXCEPT FOR BOARD WEIGHT STATISTICS, PER UNIT OF OUTPUT ALWAYS REFERS TO THE GROSS MATERIAL REQUIREMENTS OR COSTS OF INPUTS PER UNIT OF FINISHED BOARD PRODUCT OUTPUT AND INCLUDE THE QUANTITIES OR COSTS OF ALL MATERIALS LOST FROM THE FINISHED PRODUCT OUTPUT AS TRIMS OR RESIDUE. BOARD WEIGHT STATISTICS ARE ABSOLUTE STATISTICS WHICH DO NOT INVOLVE PROCESSING WEIGHT LOSSES.

SENSITIVITY OF UNIT VARIABLE COST \*\*\* THE SENSITIVITY OF THE UNIT VARIABLE COST (COST PER CUBIC FOOT OF OUTPUT) TO THE COSTS OF WOOD, RESIN, WAX, ELECTRICITY, AND FUEL ARE EXPRESSED IN THE FORM OF LINEAR EQUATIONS. THESE EQUATIONS APPLY ONLY TO THE SENSITIVITY OF GROSS VARIABLE COST PER CUBIC FOOT OF FINISHED PRODUCT OUTPUT.

ALPHABETICAL LISTING AND DEFINITIONS OF PROGRAM VARIABLES

'INPUT' MEANS THE VARIABLE IS AN INPUT VARIABLE AND HENCE OCCURS ALSO IN THE DATA DECK



```

C*
C* 'INTERNAL' MEANS THE VARIABLE IS USED STRICTLY WITHIN
C* THE PROGRAM AND APPEARS ONLY FOR THE PURPOSES
C* OF CALCULATION OR CLARIFICATION
C*
C* 'OUTPUT' MEANS THE VARIABLE WILL APPEAR AS PART
C* OF THE PRINTED OUTPUT (A FEW VARIABLES ARE
C* BOTH 'INPUT' AND 'OUTPUT')
C*
C* 'SUB1' MEANS THE VARIABLE IS USED WITHIN SUBROUTINE 'SUB1'
C*
C* 'SUB2' MEANS THE VARIABLE IS USED WITHIN SUBROUTINE 'SUB2'
C*
C* * * * *
C*
C* A1-A5...(OUTPUT) SENSITIVITY ANALYSIS FIRST ORDER COEFFICIENTS
C* OR 'SLOPE' TERMS IN THE LINEAR EQUATIONS RELATING NET
C* VARIABLE COST TO THE COST, ON AN INPUT BASIS OF ROUNDWOOD,
C* RESIN, WAX, ELECTRIC POWER, AND FUEL
C*
C* ABTR....(INTERNAL) AVERAGE EFFECTIVE B.T.U. PER POUND OF
C* RESIDUES
C*
C* AUXF....(INTERNAL) THE PERCENT OF TOTAL WOOD AND AUXILIARY FUEL
C* ON A B.T.U. BASIS WHICH MUST BE AUXILIARY FUEL REQUIRED
C* TO BURN WOOD OR BARK FUEL (AUXF IS ASSIGNED A VALUE BY
C* THE PROGRAM)
C*
C* AUXI....(OUTPUT) UNITS OF AUXILIARY FUEL REQUIRED (BARRELS OF OIL
C* OR MCF OF NATURAL GAS) PER CUBIC FOOT OF CUT PANEL
C* PRODUCT
C*
C* AVH.....(SUB1) AVAILABLE HEAT OF WOOD FUEL (BTU'S PER POUND)
C*
C* B1-B5...(OUTPUT) SENSITIVITY ANALYSIS CONSTANTS IN THE LINEAR
C* EQUATIONS RELATING NET VARIABLE COST TO THE COST, ON AN
C* INPUT BASIS OF ROUNDWOOD, RESIN, WAX, ELECTRIC POWER,
C* AND FUEL
C*
C* BAUX....(OUTPUT) B.T.U.S SUPPLIED BY AUXILIARY FUEL PER CU. FT.
C* CUT PANEL PRODUCT
C*
C* BTBK....(OUTPUT) B.T.U. VALUE OF THE BARK FUEL GENERATED PER
C* CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* BTEF....(SUB2) MILLION EFFECTIVE B.T.U. PER UNIT OF FUEL FOR
C* NON-RESIDUE FUELS
C*
C* BTFH....(INTERNAL) MILLION EFFECTIVE B.T.U.'S IN PROCESS WOOD
C* RESIDUE FUEL PER CUBIC FOOT CUT PANELS
C*
C* RTFU....(SUB2) B.T.U. VALUE OF FUEL PER UNIT OF FUEL IN
C* MILLION B.T.U. PER FUEL UNIT
C*
C* BT=CCCCC+N-OT+OOTPOT+ M+LL+ONS OF BCTCOC --+ +-E+ +T T+E BO+LE-
C* BY THE DRIER TO EVAPORATE ONE POUND OF MOISTURE
C*
C* BTRH....(INPUT+OUTPUT) MILLIONS OF B.T.U. REQUIRED AT THE BOILER
C* FOR HEATING STEAM PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* BTRM....(INPUT+OUTPUT) MILLIONS OF B.T.U. REQUIRED AT THE BOILER
C* FOR MISCELLANEOUS PURPOSES PER CUBIC FOOT OF CUT PANEL
C* PRODUCT
C*
C* BTRP....(INPUT+OUTPUT) MILLIONS OF B.T.U. REQUIRED AT THE BOILER
C* FOR THE PRESS PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* BTRT....(INPUT+OUTPUT) MILLIONS OF B.T.U. REQUIRED AT THE BOILER
C* FOR THE THAW POND PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* BTUB....(INPUT) HIGHER HEATING VALUE IN MILLIONS OF B.T.U. PER
C* POUND OF OVEN DRY BARK FUEL
C*
C* BTUC....(INPUT) HIGHER HEATING VALUE OF COAL IN MILLION B.T.U.
C* PER TON OF COAL
C*
C* BTUE....(SUB1) EFFECTIVE B.T.U.S PER POUND OF WOOD OR BARK
C* RESIDUES FUEL
C*

```

C\* BTUF....(INPUT) HIGHER HEATING VALUE IN MILLIONS OF B.T.U. PER  
 C\* POUND OF OVEN DRY FINES FUEL  
 C\*  
 C\* BTUG....(INPUT) HIGHER HEATING VALUE OF NAT. GAS IN MILLION  
 C\* B.T.U. OF NATURAL GAS  
 C\*  
 C\* BTUO....(INPUT) HIGHER HEATING VALUE OF OIL IN MILLION B.T.U.  
 C\* PER BARREL OF OIL  
 C\*  
 C\* BTUM....(INPUT) HIGHER HEATING VALUE OF EXTERNAL WOOD FUEL IN  
 C\* MILLION B.T.U. PER TON OF WOOD FUEL  
 C\*  
 C\* BTVF....(INTERNAL) EFFECTIVE B.T.U. VALUE OF FINES PER CUBIC  
 C\* FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* BTHR....(OUTPUT) MILLION EFFECTIVE B.T.U.'S IN WET WOOD  
 C\* RESIDUES PER CUBIC FOOT CUT PANELS  
 C\*  
 C\* CAUX....(OUTPUT) THE COST OF AUXILIARY FUEL PER CUBIC FOOT OF  
 C\* CUT PANEL PRODUCT  
 C\*  
 C\* CCUF....(INPUT) THE COST OF WOOD RAW MATERIAL PER CUBIC FOOT OF  
 C\* WOOD RAW MATERIAL  
 C\*  
 C\* CFRW....(OUTPUT) CUBIC FEET OF WOOD RAW MATERIAL REQUIRED PER  
 C\* CUBIC FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* CKWH....(INPUT+OUTPUT) COST OF ELECTRICITY PER KILOWATT-HOUR  
 C\*  
 C\* COST....(OUTPUT) THE COST OF FUEL PER MILLION AVERAGE EFFECTIVE  
 C\* B.T.U.  
 C\*  
 C\* CORM....(INPUT) F.O.B.-MILL MARKET VALUE OF THE RESIDUE MIX  
 C\* PER POUND OF RESIDUES  
 C\*  
 C\* CORR....(INTERNAL) WEIGHT OF RESINS REQUIRED BY PROCESS FOR  
 C\* CORE FURNISH PER CU. FT. OF CUT PANEL PRODUCT (IN POUNDS)  
 C\*  
 C\* CONW....(INTERNAL) WEIGHT OF WAX REQUIRED BY PROCESS FOR CORE  
 C\* FURNISH PER CU. FT. OF CUT PANEL PRODUCT (IN POUNDS)  
 C\*  
 C\* CRES....(INPUT+OUTPUT) THE COST OF RESIN PER POUND OF RESIN  
 C\*  
 C\* CWAX....(INPUT+OUTPUT) THE COST OF WAX PER POUND OF WAX  
 C\*  
 C\* DML....(SUB1) DRY GAS HEAT LOSS PERCENT OF AVAILABLE HEAT  
 C\*  
 C\* DMCT....(SUB1) DRY BASIS MOISTURE CONTENT OF WOOD OR BARK FUEL  
 C\*  
 C\* DRYM....(OUTPUT) FUEL VALUE REQUIRED BY DRYER IN MILLION  
 C\* EFFECTIVE B.T.U. PER CUBIC FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* ERDF....(INTERNAL) MILLION EFFECTIVE B.T.U.'S PER POUND OF  
 C\* PROCESS DRY WOOD RESIDUE FUEL  
 C\*  
 C\* ERTB....(INTERNAL) THE EFFECTIVE B.T.U.'S PER POUND OF BARK FUEL  
 C\*  
 C\* ESTC....(INTERNAL) MILLION EFFECTIVE B.T.U. PER TON OF COAL  
 C\*  
 C\* ESTG....(INTERNAL) MILLION EFFECTIVE B.T.U. PER MCF OF NAT. GAS  
 C\*  
 C\* EBOO....(INTERNAL) MILLION EFFECTIVE B.T.U. PER BARREL OF OIL  
 C\*  
 C\* EBTM....(INTERNAL) MILLION EFFECTIVE B.T.U. PER TON OF EXTERNAL  
 C\* (NON-PROCESS RESIDUE) WOOD FUEL  
 C\*  
 C\* EBWR....(INTERNAL) MILLION EFFECTIVE B.T.U.'S PER POUND OF  
 C\* PROCESS WET WOOD RESIDUE FUEL  
 C\*  
 C\* EFF....(SUB1) EFFICIENCY PERCENT OF AVAILABLE HEAT  
 C\*  
 C\* FACR....(INTERNAL) WEIGHT OF RESINS REQUIRED BY PROCESS FOR  
 C\* FACE FURNISH PER CU. FT. OF CUT PANEL PRODUCT (IN POUNDS)  
 C\*  
 C\* FACT....(INTERNAL) NUMBER OF POUNDS PER BONE-DRY-UNIT  
 C\*  
 C\* FACH....(INTERNAL) WEIGHT OF WAX REQUIRED BY PROCESS FOR FACE  
 C\* FURNISH PER CU. FT. OF CUT PANEL PRODUCT (IN POUNDS)  
 C\*

C\* FPMC....(INPUT+OUTPUT) MOISTURE CONTENT OF THE WOOD IN THE  
 C\* FINISHED PRODUCT (PERCENT O.D. BASIS)  
 C\*  
 C\* FPSZ....(INTERNAL) FINISHED PANEL SIZE IN SQUARE INCHES  
 C\*  
 C\* FRON....(OUTPUT) NET FUEL VALUE REQUIRED IN MILLION EFFECTIVE  
 C\* B.T.U. PER CU. FT. OF CUT PANEL PRODUCT  
 C\*  
 C\* FUEL....(OUTPUT) THE UNITS OF EXTERNAL NON-RESIDUE FUEL (BARRELS,  
 C\* TONS, OR MCF) REQUIRED PER CUBIC FOOT OF CUT PANEL  
 C\* PRODUCT  
 C\*  
 C\* GB\*.....(OUTPUT) GROSS BOARD WEIGHT OF PANELS PER CUBIC FOOT  
 C\* OF PANEL (IN POUNDS)  
 C\*  
 C\* GMCT....(SUB1) GREEN BASIS MOISTURE CONTENT OF WOOD OR BARK FUEL  
 C\*  
 C\* GRFF....(INTERNAL) POUNDS OF PROCESS WOOD FUEL FINES AND TRIMS  
 C\* GENERATED PER CU. FT. OF CUT PANEL PRODUCT  
 C\*  
 C\* GRMC....(INPUT) MOISTURE CONTENT OF WOOD FURNISH RAW MATERIAL  
 C\* BEFORE ENTERING PROCESS (% O.D.)  
 C\*  
 C\* GRND....(OUTPUT) POUNDS OF GREEN WOOD RAW MATERIAL REQUIRED  
 C\* PER CU. FT. OF CUT PANEL PRODUCT  
 C\*  
 C\* GRWF....(INTERNAL) POUNDS OF PROCESS WOOD FUEL FINES AND TRIMS  
 C\* AVAILABLE (AFTER DEDUCTION OF THE NON-RENEWABLE LOSS)  
 C\* PER CUBIC FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* GWOD....(OUTPUT) POUNDS OF OVEN DRY WOOD REQUIRED PER CUBIC  
 C\* FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* GWOD....(INTERNAL) GROSS OVEN DRY WEIGHT OF PARTICLEBOARD  
 C\* OUTPUT PER CUBIC FOOT OF CUT PANEL PRODUCT (IN POUNDS)  
 C\*  
 C\* GWTF....(INTERNAL) GROSS POUNDS OF FURNISH (WOOD PLUS ANY  
 C\* RECYCLED TRIMS) PER CUBIC FOOT CUT PANEL PRODUCT  
 C\*  
 C\* HML....(SUB1) HYDROGEN HEAT LOSS PERCENT OF AVAILABLE HEAT  
 C\*  
 C\* HMTV....(SUB1) THE HIGHER HEATING VALUE OF A WOOD OR BARK FUEL  
 C\* IN B.T.U.S PER POUND  
 C\*  
 C\* IFOP....(INTERNAL) INTEGER OPTION VARIABLE SPECIFYING THE TYPE OF  
 C\* FUEL BEING USED; OIL, COAL, NAT. GAS OR WOOD  
 C\*  
 C\* IOP1....(INPUT) AN OPTION VARIABLE TO SPECIFY THE KIND OF  
 C\* OUTPUT TO BE DELIVERED IN COLUMN TWO OF THE PRINTOUT  
 C\*  
 C\* IOP2....(INPUT) AN OPTION VARIABLE TO SPECIFY THE KIND OF  
 C\* OUTPUT TO BE DELIVERED IN COLUMN THREE OF THE PRINTOUT  
 C\*  
 C\* ITOP....(INPUT) AN OPTION VARIABLE TO SPECIFY WHETHER OR NOT  
 C\* TRIMS WILL BE RECYCLED AS FURNISH (0=RECYCLED, 1=TRIMS  
 C\* USED AS FUEL)  
 C\*  
 C\* NAIF....(INTERNAL) AN OPTION VARIABLE TO CONTROL THE TYPE OF  
 C\* AUXILIARY FUEL BEING USED (1 FOR OIL, 2 FOR NATURAL GAS)  
 C\*  
 C\* NCOP....(INPUT) AN OPTION VARIABLE TO CONTROL THE NUMBER OF  
 C\* COPIES OF PRINTED OUTPUT (1 TO 10)  
 C\*  
 C\* NOPT....(INPUT) AN OPTION VARIABLE TO CONTROL THE WIDTH OF  
 C\* THE PRINTED OUTPUT (3 OR 5 COLUMNS OF DATA)  
 C\*  
 C\* ODMC....(INPUT) MOISTURE CONTENT OF THE WOOD COMING OUT OF THE  
 C\* DRYER (% O.D.)  
 C\*  
 C\* ODAP....(INPUT+OUTPUT) THE OVEN DRY WEIGHT OF THE PRESSED PANELS  
 C\* PER CUBIC FOOT OF PANEL (IN POUNDS)  
 C\*  
 C\* ODWW....(OUTPUT) THE OVEN DRY WEIGHT OF WOOD AFTER PRESSING  
 C\* IN A CUBIC FOOT OF PRESSED PANEL (IN POUNDS)  
 C\*  
 C\* P.....(INTERNAL) PRICE OF FUEL PER EFFECTIVE B.T.U.  
 C\*  
 C\* PCCF....(INPUT) PERCENT OF THE PRODUCT THAT IS CORE FURNISH  
 C\*  
 C\* PCFF....(INPUT) PERCENT OF THE PRODUCT THAT IS FACE FURNISH



C\* PCOL....(INPUT) PRICE OF COAL IN DOLLARS PER TON  
 C\*  
 C\* PCON....(OUTPUT) THE PROFIT CONTRIBUTION AS THE NET SALES VALUE  
 C\* MINUS THE VARIABLE COSTS OF PRODUCTION PER CUBIC FOOT  
 C\* OF CUT PANEL PRODUCT  
 C\*  
 C\* PCRA....(OUTPUT) THE PROFIT CONTRIBUTION RATIO (RATIO OF THE  
 C\* PROFIT CONTRIBUTION TO NET SALES VALUE)  
 C\*  
 C\* PCTB....(INPUT+OUTPUT) VOLUME RATIO OF BARK TO WOOD IN THE  
 C\* ROUNDWOOD RAW MATERIAL EXPRESSED AS A DECIMAL  
 C\*  
 C\* PCTF....(INPUT+OUTPUT) THE RECOVERABLE PERCENT FINES-LOSS IN  
 C\* CUTTING AND CHIPPING OF RAW WOOD (PERCENT OF RAW WOOD)  
 C\*  
 C\* PCTR....(SUB1) PERCENT EXCESS AIR IN RESIDUE FUEL COMBUSTION  
 C\* (ASSIGNED A VALUE OF 40% BY THE PROGRAM)  
 C\*  
 C\* PCTT....(OUTPUT) PERCENT OF PARTICLEBOARD OUTPUT THAT IS CUT  
 C\* AWAY AS TRIMS  
 C\*  
 C\* PERM....(INTERNAL) A PERCENT OF THE FINES GENERATED THAT IS  
 C\* PERMANENTLY LOST (NON-RECOVERABLE LOSS-NOT TO BE  
 C\* CONFUSED WITH 'PCTF')  
 C\*  
 C\* PF.....(INTERNAL) COST OF EXTERNAL PURCHASED FUEL, EXCLUDING  
 C\* AUXILIARY FUEL PER CU. FT. CUT PANELS  
 C\*  
 C\* PGAS....(INPUT) PRICE OF NATURAL GAS IN DOLLARS PER MCF  
 C\*  
 C\* POIL....(INPUT) PRICE OF OIL IN DOLLARS PER BARREL  
 C\*  
 C\* PPLG....(INPUT) THE LENGTH OF THE CUT PANEL PRODUCT IN INCHES  
 C\*  
 C\* PPWD....(INPUT) THE WIDTH OF THE CUT PANEL PRODUCT IN INCHES  
 C\*  
 C\* PR.....(OUTPUT) THE PERCENT OF THE OVEN DRY PANEL PRODUCT THAT  
 C\* IS RESIN, BY WEIGHT  
 C\*  
 C\* PPRC....(INPUT) THE REQUIRED RESIN WEIGHT PERCENT OF CORE FURNISH  
 C\*  
 C\* PPRF....(INPUT) THE REQUIRED RESIN WEIGHT PERCENT OF FACE FURNISH  
 C\*  
 C\* PTLG....(INPUT) THE WIDTH IN INCHES OF THE STRIP OF TRIMS CUT  
 C\* AWAY ALONG THE PANEL LENGTH (AVERAGE FIGURE)  
 C\*  
 C\* PTWD....(INPUT) THE WIDTH IN INCHES OF THE STRIP OF TRIMS CUT  
 C\* AWAY ALONG THE PANEL WIDTH (AVERAGE FIGURE)  
 C\*  
 C\* PW.....(OUTPUT) THE PERCENT OF THE OVEN DRY PANEL PRODUCT THAT  
 C\* IS WAX, BY WEIGHT  
 C\*  
 C\* PWOD....(INPUT) PRICE OF EXTERNAL WOOD FUEL IN DOLLARS PER TON  
 C\*  
 C\* PWRC....(INPUT) THE REQUIRED WAX PERCENT OF CORE FURNISH  
 C\*  
 C\* PWRF....(INPUT) THE REQUIRED WAX PERCENT OF FACE FURNISH  
 C\*  
 C\* PWSR....(INPUT) THE PERCENT OF GREEN WOOD RAW MATERIAL WHICH IS  
 C\* LOST AS SCREENED WET RESIDUES IN THE PROCESS FROM THE  
 C\* DEBARKER TO THE DRYER BUT WHICH MAY BE RECOVERED AS  
 C\* 'WET SCREENED' WOOD FUEL  
 C\*  
 C\* RDWC....(OUTPUT) THE COST OF WOOD RAW MATERIAL PER CUBIC FOOT  
 C\* OF CUT PANEL PRODUCT  
 C\*  
 C\* RESR....(OUTPUT) MARKET VALUE OR REALIZATION FOR EXCESS RESIDUES  
 C\* (ASSUMES EXCESS RESIDUES ARE MARKETED IN A MIX WITH  
 C\* AMOUNTS OF EACH RESIDUE TYPE PROPORTIONAL TO AMOUNTS  
 C\* PRODUCED) PER CU. FT. CUT PANEL PRODUCT  
 C\*  
 C\* RESV....(OUTPUT) MARKET VALUE OF RESIDUE MIX PER BONE-DRY-UNIT  
 C\* (2400 POUNDS)  
 C\*  
 C\* RWHM....(INPUT+OUTPUT) THE REQUIRED KILOWATT-HOURS OF ELECTRICITY  
 C\* PER CUBIC FOOT OF CUT PANEL PRODUCT  
 C\*  
 C\* SALE....(INPUT+OUTPUT) THE NET SALES VALUE OF THE CUT PANEL  
 C\* PRODUCT PER CUBIC FOOT

```

C*
C* SGRK....(INPUT) THE OVEN DRY SPECIFIC GRAVITY OF THE BARK
C*
C* SGRW....(INPUT+OUTPUT) THE OVEN DRY SPECIFIC GRAVITY OF THE WOOD
C* RAW MATERIAL
C*
C* SHL....(SUB1) SENSIBLE HEAT LOSS (HEAT LOSS DUE TO MOISTURE)
C* PERCENT OF AVAILABLE HEAT
C*
C* T1.....(SUB1) TEMPERATURE OF RESIDUE FUELS AND FURNACE AIR
C* BEFORE COMBUSTION IN DEGREES FAHRENHEIT
C*
C* T2.....(SUB1) STACK GAS TEMPERATURE FOR COMBUSTION OF RESIDUE
C* FUELS IN DEGREES FAHRENHEIT
C*
C* TBTG....(OUTPUT) TOTAL FUEL VALUE GENERATED, MILLION EFFECTIVE
C* B.T.U. PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* TTHW....(OUTPUT) TOTAL FUEL VALUE REQUIRED BY DRYER AND PROCESS
C* STEAM, MILLION B.T.U. PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* TCDH....(OUTPUT) THE DRYER HEAT PORTION OF HEAT ENERGY COST
C* PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* TCFR....(INTERNAL) THE TOTAL COST OF FUEL PER CUBIC FOOT OF CUT
C* PANEL PRODUCT (INCLUDES COST OF AUXILIARY FUEL)
C*
C* TCAX....(OUTPUT) THE TOTAL COST FOR ELECTRIC POWER PER CUBIC
C* FOOT OF CUT PANEL PRODUCT
C*
C* TCPS....(OUTPUT) THE PROCESS STEAM SHARE OF TOTAL HEAT ENERGY
C* COST PER CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* TCHE....(OUTPUT) TOTAL COST OF RESIN PER CUBIC FOOT OF CUT
C* PANEL PRODUCT
C*
C* TCWX....(OUTPUT) TOTAL COST OF WAX PER CUBIC FOOT OF CUT PANEL
C* PRODUCT
C*
C* TML.....(SUB1) TOTAL HEAT LOSS PERCENT OF AVAILABLE HEAT
C*
C* TITL....(INPUT+OUTPUT) AN ALPHANUMERIC ARRAY FOR THE PRINTED
C* OUTPUT TITLE WHICH MAY BE SPECIFIED IN THE DATA DECK
C*
C* TMWT....(INTERNAL) POUNDS OF TRIMS GENERATED PER CUBIC FOOT OF
C* CUT PANEL PRODUCT
C*
C* TNVC....(OUTPUT) THE GROSS VARIABLE COST OF ENERGY AND RAW
C* MATERIALS FOR THE PRODUCTION PROCESS PER CUBIC FOOT OF
C* CUT PANEL PRODUCT
C*
C* TRES....(OUTPUT) TOTAL WEIGHT OF RESIN REQUIRED IN POUNDS PER
C* CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* TRMS....(INTERNAL) SQUARE INCHES OF TRIM LOSS PER PANEL
C*
C* TWAX....(OUTPUT) TOTAL WEIGHT OF WAX REQUIRED IN POUNDS PER
C* CUBIC FOOT OF CUT PANEL PRODUCT
C*
C* V(I,J)..(OUTPUT) TWO DIMENSIONAL ARRAY FOR STORAGE OF OUTPUT
C* VARIABLES AND CONVERSION TO MSF AND CUBIC METER BASIS
C*
C* WBMK....(INPUT) THE MOISTURE CONTENT OF THE BARK (PERCENT
C* OVEN DRY BASIS)
C*
C* WBR....(OUTPUT) WEIGHT OF RESINS IN THE PANELS (IN POUNDS
C* PER CUBIC FOOT OF PRESSED PANEL)
C*
C* WDW....(OUTPUT) WEIGHT OF WATER IN THE PANELS (IN POUNDS PER
C* CUBIC FOOT OF PRESSED PANEL)
C*
C* WTD....(SUB1) WEIGHT OF DRY FUEL PER POUND OF GREEN OR WET
C* WOOD OR BARK FUEL
C*
C* WTR....(INTERNAL) POUNDS OF WET WOOD RESIDUES GENERATED PER
C* CUBIC FOOT CUT PANEL PRODUCT
C*
C* WXX....(OUTPUT) WEIGHT OF WAX IN THE PANELS (IN POUNDS PER
C* CUBIC FOOT OF PRESSED PANEL)
C*

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DIMENSION V(5,40),TITL(60),P(4)	PB	1
HEAD(5,1) CCUF,SGRW,GRMC,PCTB,HBMC,SGBK,CRES,PHRF,PRRC,CWAX,PHRF,	PB	2
1PWR,ODMC,PCTF,PCFF,PCCF,ODWP,FPNC,PTLG,PTWD,PWSR,CORM,CKWH,BTUF,	PB	
2BTUR,BTWD,BTRP,BTRT,BTRM,BTRH,RKWH,PPWD,PPLG,SALE,PGAS,POIL,PWOD,	PB	
3PCOL,BTUG,BTUD,BTUM,BTUC,ITOP,IOPI,IOPI2,NOPT,NCOP,(TITL(I),I=1,60,	PB	5
1 FORMAT(6(7(F10.1),411,12/(20A4)))	PB	6
V(1,1)=SALE	PB	7
V(1,13)=ODWP	PB	8
V(1,34)=RKWH	PB	9
C *** WATER WT. IN CU. FT. PRESSED PANEL (M.C. BASED ON O.D. WT.)	PB	10
WOD=ODWP*FPNC	PB	11
V(1,12)=WOD	PB	12
C *** RESIN WT. IN CU. FT. PRESSED PANEL-EXCLUDING RECYCLED TRIMS RESIN	PB	13
WOR=ODWP*((PCFF*PHRF)+(PCCF*PRRC))	PB	14
V(1,14)=WOR	PB	15
C *** WAX WT. IN CU. FT. PRESSED PANEL-EXCLUDING RECYCLED TRIMS WAX	PB	16
WXX=ODWP*((PCFF*PHRF)+(PCCF*PRRC))	PB	17
V(1,15)=WXX	PB	18
C *** O.D. WT. OF WOOD (OR 'FURNISH' IF TRIMS RECYCLED) IN CU. FT. PANEL	PB	19
OWD=ODWP-WOR-WXX	PB	20
V(1,17)=OWD	PB	21
C *** WT. OF PANELS INCLUDING MOISTURE/CU. FT.	PB	22
GBW=OWD+PDW	PB	23
V(1,11)=GBW	PB	24
C *** RESIN WEIGHT PERCENT OF FURNISH,WAX AND RESIN IN O.D. PANEL	PB	25
PR=WOR/ODWP	PB	26
C *** WAX WEIGHT PERCENT OF FURNISH,WAX AND RESIN IN O.D. PANEL	PB	27
PX=WXX/ODWP	PB	28
C *** SQUARE INCH OF TRIM LOSS PER PANEL	PB	29
TRMS=((PTLG*PPLG)+(PTWD*(PPWD*(2.0*PTLG))))*2.0	PB	30
C *** FINISHED PANEL SIZE IN SQ. IN.	PB	31
FPSZ=PPLG*PPWD	PB	32
C *** PERCENT OF GROSS OUTPUT THAT IS TRIMS	PB	33
PCTT=TRMS/(FPSZ+TRMS)	PB	34
C *** O.D. WT. OF GROSS OUTPUT PER CU. FT. TRIMMED FINISHED PANELS	PB	35
GWOD=ODWP*(1.0/(1.0-PCTT))	PB	36
C *** WEIGHT OF FACE RESINS REQUIRED PER CU. FT. CUT PANELS	PB	37
FACR=GWOD*PHRF*PCFF	PB	38
C *** WEIGHT OF CORE RESINS REQUIRED PER CU. FT. OF CUT PANELS	PB	39
CORR=GWOD*PHRC*PCCF	PB	40
C *** WEIGHT OF FACE WAX REQUIRED PER CU. FT. OF CUT PANEL PRODUCT	PB	41
FACW=GWOD*PHWF*PCFF	PB	42
C *** WEIGHT OF CORE WAX REQUIRED PER CU. FT. OF CUT PANEL PRODUCT	PB	43
CORW=GWOD*PHWC*PCCF	PB	44
C *** TOTAL WT. OF RESIN REQUIRED/CU. FT. CUT PANELS	PB	45
TRES=FACR+CORR	PB	46
V(1,21)=TRES	PB	47
C *** TOTAL WT. OF WAX REQUIRED/CU. FT. CUT PANELS	PB	48
TAX=FACW+CORW	PB	49
V(1,22)=TAX	PB	50
C *** TOTAL COST OF RESIN/CU. FT. CUT PANELS	PB	51
TCRE=TRES*CRES	PB	52
V(1,3)=TCRE	PB	53
C *** TOTAL COST OF WAX/CU. FT. CUT PANELS	PB	54
TCWX=TAX*CWAX	PB	55
V(1,4)=TCWX	PB	56
C *** GROSS LBS. OF FURNISH NEEDED/CU. FT. CUT PANEL	PB	57
GTF=(GWOD-(TAX+TRES))	PB	58
C *** GROSS O.D. LBS. OF WOOD NEEDED IF TRIMS ARE NOT RECYCLED	PB	59
IF(ITOP.EQ. 1) GWOD=(GTF*(1.0/(1.0-PCTF)))+(1.0/(1.0-PWSR))	PB	60
C *** LBS. OF TRIMS GENERATED/CU. FT. CUT PANELS	PB	61
TMNT=GWOD*PCTT	PB	62
C *** GROSS O.D. LBS. OF WOOD NEEDED IF TRIMS ARE RECYCLED	PB	63
IF(ITOP.EQ. 0) GWOD=(GTF*(0.5+TMNT))*(1.0/(1.0-PCTF))*(1.0/(1.0-	PB	64
PWSR))	PB	65
V(1,18)=GWOD	PB	66
C *** GROSS LBS. OF GREEN WOOD NEEDED/CU. FT. CUT PANELS	PB	67
GRWD=GWOD*(1.0+GRMC)	PB	68
V(1,19)=GRWD	PB	69
C *** CU. FT. OF ROUNDWOOD NEEDED/CU. FT. CUT PANELS	PB	70
CFRW=GRWD*(1.0/(62.4*SGRW))	PB	71
V(1,20)=CFRW	PB	72
C *** LBS. OF GENERATED DRY FUEL FINES AND TRIMS/CU. FT. CUT PANELS	PB	73
IF(ITOP.EQ. 0) GRFF=((GTF*(0.5+TMNT))*(1.0/(1.0-PCTF)))-(GTF*(0.5	PB	74
1.5+TMNT))+0.5*TMNT	PB	75
IF(ITOP.EQ. 1) GRFF=(GTF*(1.0/(1.0-PCTF))-GTF)+TMNT	PB	76
C *** PERCENT THE NON-RENEWABLE FINES LOSS PERCENT (PERMANENTLY LOST)	PB	77
PER=0.03	PB	78
C *** LBS OF GENERATED DRY WOOD FUELS MINUS THE NON-RENEWABLE LOSS	PB	79
GNWF=GRFF-(GRFF*PER)	PB	80



C *** B.T.U. VALUE OF DRIED WOOD FUELS/CU. FT. CUT PANELS	PB	81
CALL SUB1(BTUF,ODMC,EBUF)	PB	82
BTVF=GRWF*(1.0+ODMC)*ERDF	PB	83
V(1,29)=BTVF	PB	84
C *** POUNDS OF NET SCREENED WOOD RESIDUE FUEL (FROM DEBARKER)	PB	85
WT=RGPD*PWSR	PB	86
C *** B.T.U. VALUE OF NET SCREENED WOOD RESIDUE/CU. FT. CUT PANEL	PB	87
CALL SUB1(BTUF,GRMC,EHWR)	PB	88
BTWR=TWRR*EHWR	PB	89
C *** TOTAL B.T.U. VALUE OF GENERATED WOOD FUELS	PB	90
BTFR=BTVF+BTWR	PB	91
C *** B.T.U. VALUE OF BARK/CU. FT. CUT PANELS	PB	92
CALL SUB1(BTUR,WBMC,EBTB)	PB	93
MTBK=PCTH*(SGBK/SGRW)*GRWD*EBTB	PB	94
V(1,30)=MTBK	PB	95
C *** TOTAL FUEL VALUE GENERATED/CU. FT. CUT PANELS	PB	96
TPTG=BTFR+BTBK	PB	97
C *** WEIGHTED AVERAGE EFFECTIVE B.T.U. PER POUND OF RESIDUE MIX	PB	98
ABTR=BTBG/(GRWF+BTWR+PCTB*GRWD*(SGBK/SGRW))	PB	99
V(1,31)=ABTR	PB	100
C *** FUEL VALUE REQUIRED BY DRYER/CU. FT. CUT PANELS	PB	101
DMYM=(G*OD*GRMC-GWOD*ODMC)*BTBD	PB	102
V(1,23)=DRYM	PB	103
C *** TOTAL FUEL VALUE REQUIRED, DRYER AND PROC. STEAM/CU. FT. PANELS	PB	104
TBTR=DRYM+BTBP+BTBT+ATRM+BTBM	PB	105
V(1,28)=TBTR	PB	106
C *** AUXF IS THE AVG. PERCENT OF GENERATED B.T.U.'S THAT MUST COME	PB	107
C *** FROM AUXILIARY OIL FUEL FOR B.T.U.'S GENERATED WITH WOOD FUELS	PB	108
AUXF=0.15	PB	109
C *** NET EXTERNAL FUEL B.T.U. REQUIRED/CU. FT. CUT PANEL	PB	110
FRQN=TBTR-(BTBG*(1.0/(1.0-AUXF)))	PB	111
IF (FRQN .LE. 0.0) FRQN=0.0	PB	112
V(1,32)=FRQN	PB	113
TCFR=0.0	PB	114
TCPS=0.0	PB	115
TCOM=0.0	PB	116
FUEL=0.0	PB	117
IF (FRQN .LE. 0.0) IFOP=4	PB	118
PF=0.0	PB	119
CALL SUB2(BTUO,EBTO,0)	PB	120
CALL SUB2(BTUC,EBTC,1)	PB	121
CALL SUB2(BTUG,EBTG,2)	PB	122
CALL SUB2(MTUN,EBTN,3)	PB	123
P(1)=POIL*(EBTO**1.0)	PB	124
P(2)=PCOL*(EBTC**1.0)	PB	125
P(3)=PGAS*(EBTG**1.0)	PB	126
P(4)=PHOD*(1.0-AUXF)*(EBTN**1.0)+(POIL*AUXF*(EBTO**1.0))	PB	127
C *** FIND THE CHEAPEST AUXILIARY FUEL (OIL OR NAT. GAS)	PB	128
IF (P(1) .LT. P(3)) NAXF=1	PB	129
IF (P(3) .LT. P(1)) NAXF=3	PB	130
IF (IFOP .EQ. 4) GO TO 40	PB	131
C *** FIND THE CHEAPEST EXTERNAL FUEL; OIL, COAL, GAS, OR WOOD PER BTU	PB	132
IFOP=0	PB	133
K=IFOP+1	PB	134
DO 10 I=2,4	PB	135
IF (P(I) .LT. P(K)) K=I	PB	136
10 CONTINUE	PB	137
IFOP=K-1	PB	138
C *** TOTAL COST OF EXTERNAL FUEL PER CU. FT. CUT PANEL	PB	139
PF=P(K)*FRQN	PB	140
C *** CALCULATE UNITS OF EXTERNAL FUEL REQUIRED, BBL. OIL, MCF. NAT.	PB	141
C *** GAS, TONS COAL OR TONS WOOD (EXCLUDING AUXILIARY OIL)	PB	142
IF (IFOP .EQ. 0) FUEL=FRQN*(EBTO**1.0)	PB	143
IF (IFOP .EQ. 1) FUEL=FRQN*(EBTC**1.0)	PB	144
IF (IFOP .EQ. 2) FUEL=FRQN*(EBTG**1.0)	PB	145
IF (IFOP .EQ. 3) FUEL=(FRQN*(AUXF*FRQN))*(EBTN**1.0)	PB	146
C *** WEIGHTED AVERAGE COST PER MILLION EFFECTIVE B.T.U. OF FUEL	PB	147
IF (IFOP .EQ. 0) COST=P(1)*((FRQN/TBTR)+((TBTR-FRQN)/TBTR)*AUXF)	PB	148
IF (IFOP .EQ. 1) COST=P(2)*((FRQN/TBTR)+((TBTR-FRQN)/TBTR)*AUXF)	PB	149
IF (IFOP .EQ. 2) COST=P(3)*((FRQN/TBTR)+((TBTR-FRQN)/TBTR)*AUXF)	PB	150
IF (IFOP .EQ. 3) COST=P(4)*FRQN/TBTR+P(1)*((TBTR-FRQN)/TBTR)*AUXF	PB	151
RESR=0.0	PB	152
40 CONTINUE	PB	153
V(1,33)=FUEL	PB	154
C *** CALCULATE AUXILIARY FUEL NEEDED (AUX1) PER CU. FT. CUT PANEL	PB	155
C *** UNITS OF AUXILIARY FUEL REQUIRED TO BURN RESIDUES	PB	156
IF (NAXF .EQ. 1) AUX1=(AUXF/(1.0-AUXF))*BTBG*(EBTO**1.0)	PB	157
IF (NAXF .EQ. 3) AUX1=(AUXF/(1.0-AUXF))*BTBG*(EBTG**1.0)	PB	158
C *** AUXILIARY FUEL REQUIRED IF ONLY WOOD FUEL (INCL. RESIDUES) IS USED	PB	159
IF (IFOP .GE. 3 .AND. NAXF .EQ. 1) AUX1=AUXF*TBTR*(EBTO**1.0)	PB	160

IF(IFOP .GE. 3 .AND. NAXF .EQ. 3) AUXI=AUXF*TBTR*(EBTG**1.0)	PB	161
V(1,35)=AUXI	PB	162
C *** B.T.U.S SUPPLIED BY AUXILIARY FUEL PER CU. FT. CUT PANEL	PB	163
IF(NAXF .EQ. 1) BAUX=AUXI*EBTO	PB	164
IF(NAXF .EQ. 3) BAUX=AUXI*EBTG	PB	165
V(1,37)=BAUX	PB	166
C *** CALCULATE COST OF AUXILIARY FUEL PER CU. FT. CUT PANEL	PB	167
IF(NAXF .EQ. 1) CAUX=AUXI*POIL	PB	168
IF(NAXF .EQ. 3) CAUX=AUXI*PGAS	PB	169
C *** TOTAL COST OF PURCHASED FUEL PER CU. FT. CUT PANEL	PB	170
TCFR=CAUX+PF	PB	171
TCOH=(DRYM/TBTR)*TCFR	PB	172
TCPS=TCFR-TCOH	PB	173
IF(IFOP .NE. 4) GO TO 50	PB	174
C *** RESIDUE REALIZATION IF EXCESS RESIDUES ARE AVAILABLE	PB	175
RESR=(TBTR*(1.0-AUXF)-TBTG)*(ABTR**1.0)*CORM	PB	176
C *** WEIGHTED AVERAGE COST PER B.T.U.	PB	177
IF(NAXF .EQ. 1) COST=POIL*(EBTO**1.0)+AUXF	PB	178
IF(NAXF .EQ. 3) COST=PGAS*(EBTG**1.0)+AUXF	PB	179
50 CONTINUE	PB	180
C *** FACT=APPROX. POUNDS PER BONE DRY UNIT OF PROCESS RESIDUES	PB	181
FACT=2400.0	PB	182
C *** RESV=VALUE OF PROCESS RESIDUES/BDU	PB	183
RESV=CORM*FACT	PB	184
C *** COST OF ROUNDWOOD/CU. FT. CUT PANELS	PB	185
RDWC=CFRW*CCUF	PB	186
V(1,2)=RDWC	PB	187
C *** COST OF ELECTRICITY	PB	188
TCKW=RKWH*CKWH	PB	189
C *** TOTAL NET VARIABLE COST/CU. FT. CUT PANELS	PB	190
TNVC=RDWC+TCRE+TCWX+TCKW+TCPS+RESR+TCOH	PB	191
C *** PROFIT CONTRIBUTION AND RATIO TO SALES VALUE	PB	192
PCON=SALE-TNVC	PB	193
PCRA=PCON/SALE	PB	194
V(1,5)=TCKW	PB	195
V(1,6)=TCOH	PB	196
V(1,7)=TCPS	PB	197
V(1,8)=RESR	PB	198
V(1,9)=TNVC	PB	199
V(1,10)=PCON	PB	200
V(1,24)=BTRP	PB	201
V(1,25)=BTRT	PB	202
V(1,26)=BTRM	PB	203
V(1,27)=BTRW	PB	204
V(1,36)=BTRW	PB	205
IF(ITOP .EQ. 0) PCTI=0.5*PCTT	PB	206
C ***	PB	207
C *** ANALYSIS OF SENSITIVITY OF NET VARIABLE COST TO THE COST, ON AN	PB	208
C *** INPUT BASIS, OF ROUNDWOOD, RESIN, MAX, ELECTRIC POWER, AND FUEL	PB	209
C ***	PB	210
C *** SENSITIVITY TO ROUNDWOOD COST (ROUNDWOOD COST/CU. FT. = X )	PB	211
C *** TNVC = (CFRW)*(CCUF) + (TNVC - RDWC) (Y=A*X+B)	PB	212
A1=CFRW	PB	213
B1=TNVC-RDWC	PB	214
C *** SENSITIVITY TO RESIN COST (RESIN COST/LB. = X )	PB	215
C *** TNVC = (TRES)*(CRES) + (TNVC - TCRE) (Y=A*X+B)	PB	216
A2=TRES	PB	217
B2=TNVC-TCRE	PB	218
C *** SENSITIVITY TO MAX COST (MAX COST/LB. = X )	PB	219
C *** TNVC = (TWAX)*(CWAX) + (TNVC - TCWX) (Y=A*X+B)	PB	220
A3=TWAX	PB	221
B3=TNVC-TCWX	PB	222
C *** SENSITIVITY TO ELECTRIC POWER COST (COST/KWH = X )	PB	223
C *** TNVC = (RKWH)*(CKWH) + (TNVC - TCKW) (Y=A*X+B)	PB	224
A4=RKWH	PB	225
B4=TNVC-TCKW	PB	226
C *** SENSITIVITY TO FUEL COST (PRICE OF FUEL/FUEL UNIT = X )	PB	227
IF(IFOP .EQ. 0) B5=TNVC-FUEL*POIL	PB	228
IF(IFOP .EQ. 1) B5=TNVC-FUEL*PCOL	PB	229
IF(IFOP .EQ. 2) B5=TNVC-FUEL*PGAS	PB	230
IF(IFOP .EQ. 3) B5=TNVC-FUEL*PWOD	PB	231
A5=FUEL	PB	232
A6=AUXI	PB	233
B6=TNVC-CAUX	PB	234
IF(IFOP .EQ. 0 .OR. IFOP .EQ. 2) A5=A5+A6	PB	235
IF(IFOP .EQ. 0 .OR. IFOP .EQ. 2) B5=B5-CAUX	PB	236
C ***	PB	237
C *** DETERMINE OUTPUT VARIABLES	PB	238
C ***	PB	239
DO 60 M=1,37	PB	240



IF (IOP1 .EQ. 0) V(2,M)=31.25*V(1,M)	PB	241
IF (IOP1 .EQ. 1) V(2,M)=20.83333*V(1,M)	PB	242
IF (IOP1 .EQ. 2) V(2,M)=62.5*V(1,M)	PB	243
IF (IOP1 .EQ. 3) V(2,M)=52.08333*V(1,M)	PB	244
IF (IOP1 .EQ. 4) V(2,M)=41.6667*V(1,M)	PB	245
IF (IOP2 .EQ. 0) V(3,M)=41.6667*V(1,M)	PB	246
IF (IOP2 .EQ. 1) V(3,M)=20.83333*V(1,M)	PB	247
IF (IOP2 .EQ. 2) V(3,M)=62.5*V(1,M)	PB	248
IF (IOP2 .EQ. 3) V(3,M)=52.08333*V(1,M)	PB	249
IF (IOP2 .EQ. 4) V(3,M)=35.31*V(1,M)	PB	250
IF (NOPT .EQ. 3) GO TO 60	PB	251
V(4,M)=52.08333*V(1,M)	PB	252
V(5,M)=35.31*V(1,M)	PB	253
60 CONTINUE	PB	254
IF (NOPT .NE. 3) J=5	PB	255
IF (NOPT .EQ. 3) J=3	PB	256
PR=100.0*PR	PB	257
PM=100.0*PM	PB	258
FPMC=100.0*FPMC	PB	259
PCRA=100.0*PCRA	PB	260
PCTF=100.0*PCTF	PB	261
PCTT=100.0*PCTT	PB	262
DO 998 K=1,10	PB	263
IF (K .GE. (NCOP+1)) GO TO 999	PB	264
IF (NOPT .NE. 3) WRITE(6,70) (TITL(I),I=1,60)	PB	265
70 FORMAT('1',3(25X,20A4//))	PB	266
IF (NOPT .EQ. 3) WRITE(6,80) (TITL(I),I=1,60)	PB	267
80 FORMAT('1',3(20A4//))	PB	268
WRITE(6,90)	PB	269
90 FORMAT(' ',32X,'\$/CU.FT.')	PB	270
IF (IOP1 .EQ. 0) WRITE(6,100)	PB	271
100 FORMAT('+',44X,'\$/MSF 3/8 IN. BASIS')	PB	272
IF (IOP1 .EQ. 1) WRITE(6,110)	PB	273
110 FORMAT('+',44X,'\$/MSF 1/4 IN. BASIS')	PB	274
IF (IOP1 .EQ. 2) WRITE(6,120)	PB	275
120 FORMAT('+',44X,'\$/MSF 3/4 IN. BASIS')	PB	276
IF (IOP1 .EQ. 3) WRITE(6,130)	PB	277
130 FORMAT('+',44X,'\$/MSF 5/8 IN. BASIS')	PB	278
IF (IOP1 .EQ. 4) WRITE(6,140)	PB	279
140 FORMAT('+',44X,'\$/MSF 1/2 IN. BASIS')	PB	280
IF (IOP2 .EQ. 0) WRITE(6,150)	PB	281
150 FORMAT('+',66X,'1/2 IN. BASIS')	PB	282
IF (IOP2 .EQ. 1) WRITE(6,160)	PB	283
160 FORMAT('+',66X,'1/4 IN. BASIS')	PB	284
IF (IOP2 .EQ. 2) WRITE(6,170)	PB	285
170 FORMAT('+',66X,'3/4 IN. BASIS')	PB	286
IF (IOP2 .EQ. 3) WRITE(6,180)	PB	287
180 FORMAT('+',66X,'5/8 IN. BASIS')	PB	288
IF (IOP2 .EQ. 4) WRITE(6,190)	PB	289
190 FORMAT('+',66X,'\$/CUBIC METER')	PB	290
IF (NOPT .EQ. 0) WRITE(6,200) (V(I,1),I=1,5)	PB	291
200 FORMAT('+',84X,'5/8 IN. BASIS',5X,'\$/CU.METER')	PB	292
1' NET SALES VALUE',17X,'\$',F7.4,F7.3('\$',F9.3,8X),'\$',F9.3/)	PB	293
IF (NOPT .EQ. 3) WRITE(6,210) (V(I,1),I=1,3)	PB	294
210 FORMAT('1' NET SALES VALUE',17X,'\$',F7.4,F7.3,'\$',F9.3,8X,'\$',	PB	295
1F9.3/)	PB	296
WRITE(6,220)	PB	297
220 FORMAT('1' VARIABLE COSTS OF PRODUCTION')	PB	298
IF (NOPT .EQ. 0) WRITE(6,230) CCUF,	PB	299
1(V(I,2),I=1,5),PR,CRES,(V(I,3),I=1,5)	PB	299A
1,PM,CWAX,(V(I,4),I=1,5),CKWM,(V(I,5),I=1,5),COBT,(V(I,6),I=1,5),	PB	300
2COBT,(V(I,7),I=1,5),RESV,(V(I,8),I=1,5),(V(I,9),I=1,5),	PB	301
3(V(I,10),I=1,5),PCRA	PB	302
IF (NOPT .EQ. 3) WRITE(6,240) (V(I,2),I=1,3),PR,CRES,(V(I,3),I=1,3)	PB	303
1,PM,CWAX,(V(I,4),I=1,3),CKWM,(V(I,5),I=1,3),COBT,(V(I,6),I=1,3),	PB	304
2COBT,(V(I,7),I=1,3),RESV,(V(I,8),I=1,3),(V(I,9),I=1,3),	PB	305
3(V(I,10),I=1,3),PCRA	PB	306
230 FORMAT(' ',2X,'WOOD (\$',F6.4,'/CU. FT.),'\$,8X,'\$',	PB	307
1F7.4,F7.3('\$',F9.3,8X),'\$',F9.3/	PB	307A
13X,'RESIN (\$',F4.1,'%',F4.2,'/LB.),'\$,7X,F7.4,8X,3(F9.3,9X),F9.3/	PB	308
23X,'WAX (\$',F4.1,'%',F4.2,'/LB.),'\$,9X,F7.4,8X,3(F9.3,9X),F9.3/	PB	309
33X,'ELECTRIC POWER (\$',F5.3,'/KWH),'\$,4X,F7.4,8X,3(F9.3,9X),F9.3/	PB	310
53X,'DRYER HEAT (FUEL=\$',F5.3,'/MM BTU),'\$,1X,F7.4,8X,3(F9.3,9X),F9.3/	PB	311
53X,'PROC.STEAM (FUEL=\$',F5.3,'/MM BTU),'\$,1X,F7.4,8X,3(F9.3,9X),F9.3/	PB	312
63X,'LESS RESIDUE VAL.(\$',F6.2,'/BDU),'\$,1X,F7.4,8X,3(F9.3,9X),F9.3/	PB	313
77X,'GROSS VARIABLE COST',7X,'\$',F7.4,F7.3('\$',F9.3,8X),'\$',F9.3/	PB	314
1' PROFIT CONTRIBUTION',13X,'\$',F7.4,F7.3('\$',F9.3,8X),'\$',F9.3/	PB	315
93X,'P. C. RATIO',20X,F4.1,'%',/)	PB	316
240 FORMAT(' ',2X,'WOOD',26X,'\$',F7.4,F7.3,'\$',F9.3,8X,'\$',F9.3/	PB	317
13X,'RESIN (\$',F4.1,'%',F4.2,'/LB.),'\$,7X,F7.4,8X,F9.3,9X,F9.3/	PB	318



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23X,'MAX ('F4.1,'%, $',F4.2,'/LB.)',9X,F7.4,8X,F9.3,9X,F9.3/ PB 319
33X,'ELECTRIC POWER ($',F5.3,'/KWH)',4X,F7.4,8X,F9.3,9X,F9.3/ PB 320
53X,'PHOC.STEAM(FUEL=$',F5.3,'/MM BTU)',1X,F7.4,8X,F9.3,9X,F9.3/ PB 321
53X,'DRYER HEAT(FUEL=$',F5.3,'/MM BTU)',1X,F7.4,8X,F9.3,9X,F9.3/ PB 322
63X,'LESS RESIDUE VAL.($',F6.2,'/BDU)',1X,F7.4,8X,F9.3,9X,F9.3/ PB 323
77X,'GROSS VARIABLE COST',7X,'$',F7.4,7X,'$',F9.3,8X,'$',F9.3// PB 324
8' PROFIT CONTRIBUTION',13X,'$',F7.4,7X,'$',F9.3,8X,'$',F9.3/ PB 325
93X,'P. C. RATIO',20X,F4.1,'%',/ PB 326
WRITE(6,250) PB 327
250 FORMAT(' SENSITIVITY OF GROSS VARIABLE COST PER CU. FT. OF FINISHED PB 328
10 PRODUCT OUTPUT') PB 329
WRITE(6,270) A1,B1,A2,B2,A3,B3,A4,B4 PB 330
270 FORMAT(' ',8X,'VAR. COST/CU. FT. =',F7.4,' * (WOOD COST/CU. FT.) + PB 331
1',F7.4/ PB 332
29X,'VAR. COST/CU. FT. =',F7.4,' * (RESIN COST/LB.) + ',F7.4/ PB 333
39X,'VAR. COST/CU. FT. =',F7.4,' * (WAX COST/LB.) + ',F7.4/ PB 334
49X,'VAR. COST/CU. FT. =',F7.4,' * (ELECTRICITY COST/KWH) + ',F7.4) PB 335
IF(IPOP.EQ. 0) WRITE(6,271) A5,B5 PB 336
IF(IPOP.EQ. 1) WRITE(6,272) A5,B5 PB 337
IF(IPOP.EQ. 2) WRITE(6,273) A5,B5 PB 338
IF(IPOP.EQ. 3) WRITE(6,274) A5,B5 PB 339
IF(IPOP.EQ. 0 .OR. IPOP.EQ. 2) GO TO 275 PB 340
IF(NAXF.EQ. 1) WRITE(6,271) A6,B6 PB 341
IF(NAXF.EQ. 3) WRITE(6,273) A6,B6 PB 342
275 CONTINUE PB 343
271 FORMAT(' ',8X,'VAR. COST/CU. FT. =',F7.4,' * (PRICE OF OIL/BBL.) + PB 344
1',F7.4) PB 345
272 FORMAT(' ',8X,'VAR. COST/CU. FT. =',F7.4,' * (PRICE OF COAL/TON) + PB 346
1',F7.4) PB 347
273 FORMAT(' ',8X,'VAR. COST/CU. FT. =',F7.4,' * (PRICE OF NAT. GAS/MCPB PB 348
1F) + ',F7.4) PB 349
274 FORMAT(' ',8X,'VAR. COST/CU. FT. =',F7.4,' * (PRICE OF FUELWOOD/TOB PB 350
1N) + ',F7.4) PB 351
WRITE(6,280) PB 352
280 FORMAT('BOARD STATISTICS',13X,'LBS./CU.FT.') PB 353
IF(IOP1.EQ. 0) WRITE(6,290) PB 354
290 FORMAT('+',43X,'LBS./MSF 3/8 IN.BASIS') PB 355
IF(IOP1.EQ. 1) WRITE(6,300) PB 356
300 FORMAT('+',43X,'LBS./MSF 1/4 IN.BASIS') PB 357
IF(IOP1.EQ. 2) WRITE(6,310) PB 358
310 FORMAT('+',43X,'LBS./MSF 3/4 IN.BASIS') PB 359
IF(IOP1.EQ. 3) WRITE(6,320) PB 360
320 FORMAT('+',43X,'LBS./MSF 5/8 IN.BASIS') PB 361
IF(IOP1.EQ. 4) WRITE(6,330) PB 362
330 FORMAT('+',43X,'LBS./MSF 1/2 IN.BASIS') PB 363
IF(IOP2.EQ. 0) WRITE(6,150) PB 364
IF(IOP2.EQ. 1) WRITE(6,160) PB 365
IF(IOP2.EQ. 2) WRITE(6,170) PB 366
IF(IOP2.EQ. 3) WRITE(6,180) PB 367
IF(IOP2.EQ. 4) WRITE(6,340) PB 368
340 FORMAT('+',67X,'LBS./CU.METER') PB 369
IF(NOPT.EQ. 0) WRITE(6,350) PB 370
350 FORMAT('+',84X,'5/8 IN. BASIS',5X,'LBS./CU.METER') PB 371
IF(NOPT.EQ. 0) WRITE(6,360) (V(I,11),I=1,5),FPMC,(V(I,12),I=1,5), PB 372
1(V(I,13),I=1,5),PR,(V(I,14),I=1,5),PW,(V(I,15),I=1,5), PB 373
2(V(I,17),I=1,5) PB 374
IF(NOPT.EQ. 3) WRITE(6,370) (V(I,11),I=1,3),FPMC,(V(I,12),I=1,3), PB 375
1(V(I,13),I=1,3),PR,(V(I,14),I=1,3),PW,(V(I,15),I=1,3), PB 376
2(V(I,17),I=1,3) PB 377
360 FORMAT(' ',2X,'GROSS BOARD WEIGHT',12X,F8.3,8X,3(F9.3,9X),F9.3/ PB 378
13X,'WEIGHT OF WATER('F4.1,'% M.C.)',3X,F8.3,8X,3(F9.3,9X),F9.3/ PB 379
23X,'OVEN DRY WGT. OF BOARD',8X,F8.3,8X,3(F9.3,9X),F9.3/ PB 380
35X,'WGT. OF RESINS('F4.1,'% SOLIDS)',F8.3,8X,3(F9.3,9X),F9.3/ PB 381
45X,'WGT. OF WAX('F4.1,'% SOLIDS)',3X,F8.3,8X,3(F9.3,9X),F9.3/ PB 382
55X,'WEIGHT OF WOOD ',13X,F8.3,8X,3(F9.3,9X),F9.3/) PB 383
370 FORMAT(' ',2X,'GROSS BOARD WEIGHT',12X,F8.3,8X,F9.3,9X,F9.3/ PB 384
13X,'WEIGHT OF WATER('F5.1,'% M.C.)',2X,F8.3,8X,F9.3,9X,F9.3/ PB 385
23X,'OVEN DRY WGT. OF BOARD',8X,F8.3,8X,F9.3,9X,F9.3/ PB 386
35X,'WGT. OF RESINS('F4.1,'% SOLIDS)',F8.3,8X,F9.3,9X,F9.3/ PB 387
45X,'WGT. OF WAX('F4.1,'% SOLIDS)',3X,F8.3,8X,F9.3,9X,F9.3/ PB 388
55X,'WEIGHT OF WOOD ',13X,F8.3,8X,F9.3,9X,F9.3/) PB 389
WRITE(6,380) PB 390
380 FORMAT('RAW MATERIAL REQUIREMENTS',4X,'REQ./CU.FT.') PB 391
IF(IOP1.EQ. 0) WRITE(6,390) PB 392
390 FORMAT('+',43X,'REQ./MSF 3/8 IN.BASIS') PB 393
IF(IOP1.EQ. 1) WRITE(6,400) PB 394
400 FORMAT('+',43X,'REQ./MSF 1/4 IN.BASIS') PB 395
IF(IOP1.EQ. 2) WRITE(6,410) PB 396
410 FORMAT('+',43X,'REQ./MSF 3/4 IN.BASIS') PB 397

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IF(IOP1.EQ. 3) WRITE(6,420) PB 398
420 FORMAT('+',43X,'REQ./MSF 5/8 IN.BASIS') PB 399
IF(IOP1.EQ. 4) WRITE(6,430) PB 400
430 FORMAT('+',43X,'REQ./MSF 1/2 IN.BASIS') PB 401
IF(IOP2.EQ. 0) WRITE(6,150) PB 402
IF(IOP2.EQ. 1) WRITE(6,160) PB 403
IF(IOP2.EQ. 2) WRITE(6,170) PB 404
IF(IOP2.EQ. 3) WRITE(6,180) PB 405
IF(IOP2.EQ. 4) WRITE(6,440) PB 406
440 FORMAT('+',67X,'REQ./CU.METER') PB 407
IF(NOPT.EQ. 0) WRITE(6,450) PB 408
450 FORMAT('+',84X,'5/8 IN. BASIS',5X,'REQ./CU.METER') PB 409
IF(NOPT.EQ. 0) WRITE(6,460) SGRN,(V(I,18),I=1,5),(V(I,19),I=1,5), PB 410
1(V(I,20),I=1,5),(V(I,21),I=1,5),(V(I,22),I=1,5) PB 411
IF(NOPT.EQ. 3) WRITE(6,470) SGRN,(V(I,18),I=1,3),(V(I,19),I=1,3), PB 412
1(V(I,20),I=1,3),(V(I,21),I=1,3),(V(I,22),I=1,3) PB 413
460 FORMAT(' ',2X,'WOOD (O. D. SPEC. GRAV. =',F4.2,')',/ PB 414
15X,'POUNDS OF O.D. WOOD ',7X,F8.3,8X,3(F9.3,9X),F9.3/ PB 415
25X,'POUNDS OF GREEN WOOD ',7X,F8.3,8X,3(F9.3,9X),F9.3/ PB 416
35X,'CU. FT. OF WOODWOOD ',7X,F8.3,8X,3(F9.3,9X),F9.3/ PB 417
43X,'RESIN (LBS. SOLIDS/LIQUID)',4X,F8.3,8X,3(F9.3,9X),F9.3/ PB 418
53X,'MAX (LBS. SOLIDS)',13X,F8.3,8X,3(F9.3,9X),F9.3/ PB 419
470 FORMAT(' ',2X,'WOOD (O. D. SPEC. GRAV. =',F4.2,')',/ PB 420
15X,'POUNDS OF O.D. WOOD ',7X,F8.3,8X,F9.3,9X,F9.3/ PB 421
25X,'POUNDS OF GREEN WOOD ',7X,F8.3,8X,F9.3,9X,F9.3/ PB 422
35X,'CU. FT. OF WOODWOOD ',7X,F8.3,8X,F9.3,9X,F9.3/ PB 423
43X,'RESIN (LBS. SOLIDS/LIQUID)',4X,F8.3,8X,F9.3,9X,F9.3/ PB 424
53X,'MAX (LBS. SOLIDS)',13X,F8.3,8X,F9.3,9X,F9.3/ PB 425
WRITE(6,480) PB 426
480 FORMAT('FUEL AND POWER STATISTICS IN MILLION B.T.U.S./' PB 427
130X,'BTUS/CU.FT.') PB 428
IF(IOP1.EQ. 0) WRITE(6,490) PB 429
490 FORMAT('+',43X,'BTUS/MSF 3/8 IN.BASIS') PB 430
IF(IOP1.EQ. 1) WRITE(6,500) PB 431
500 FORMAT('+',43X,'BTUS/MSF 1/4 IN.BASIS') PB 432
IF(IOP1.EQ. 2) WRITE(6,510) PB 433
510 FORMAT('+',43X,'BTUS/MSF 3/4 IN.BASIS') PB 434
IF(IOP1.EQ. 3) WRITE(6,520) PB 435
520 FORMAT('+',43X,'BTUS/MSF 5/8 IN.BASIS') PB 436
IF(IOP1.EQ. 4) WRITE(6,530) PB 437
530 FORMAT('+',43X,'BTUS/MSF 1/2 IN.BASIS') PB 438
IF(IOP2.EQ. 0) WRITE(6,150) PB 439
IF(IOP2.EQ. 1) WRITE(6,160) PB 440
IF(IOP2.EQ. 2) WRITE(6,170) PB 441
IF(IOP2.EQ. 3) WRITE(6,180) PB 442
IF(IOP2.EQ. 4) WRITE(6,540) PB 443
540 FORMAT('+',67X,'BTUS/CU.METER') PB 444
IF(NOPT.EQ. 0) WRITE(6,550) PB 445
550 FORMAT('+',84X,'5/8 IN. BASIS',5X,'BTUS/CU.METER') PB 446
IF(NOPT.EQ. 0) WRITE(6,560) BTRD,(V(I,23),I=1,5),(V(I,24),I=1,5), PB 447
1(V(I,25),I=1,5),(V(I,26),I=1,5),(V(I,27),I=1,5),(V(I,28),I=1,5), PB 448
2PCTF,PCTT,(V(I,29),I=1,5),PCTB,(V(I,30),I=1,5),(V(I,36),I=1,5), PB 449
3(V(I,31),I=1,5),(V(I,37),I=1,5),(V(I,32),I=1,5) PB 450
IF(NOPT.EQ. 3) WRITE(6,570) BTRD,(V(I,23),I=1,3),(V(I,24),I=1,3), PB 451
1(V(I,25),I=1,3),(V(I,26),I=1,3),(V(I,27),I=1,3),(V(I,28),I=1,3), PB 452
2PCTF,PCTT,(V(I,29),I=1,3),PCTB,(V(I,30),I=1,3),(V(I,36),I=1,3), PB 453
3(V(I,31),I=1,3),(V(I,37),I=1,3),(V(I,32),I=1,3) PB 454
560 FORMAT(' FUEL REQUIREMENTS'/3X,'DRYER HEAT'/3X,'('F8.6,'BTUS/LB.WPB 455
1ATER EVAP.),'1X,F8.6,8X,3(F9.6,9X),F9.6/ PB 456
23X,'PROCESS STEAM'/7X,'PRESS',21X,F8.6,8X,3(F9.6,9X),F9.6/ PB 457
37X,'THAW POND',17X,F8.6,8X,3(F9.6,9X),F9.6/ PB 458
47X,'HEATING',19X,F8.6,8X,3(F9.6,9X),F9.6/ PB 459
57X,'MISCELLANEOUS',13X,F8.6,8X,3(F9.6,9X),F9.6/ PB 460
610X,'TOTAL FUEL REQUIRED',4X,F8.6,8X,3(F9.6,9X),F9.6// PB 461
7' WOOD FUEL GENERATED'/3X,'DRY FINES/TRIMS('F4.1,'X','F4.1,'X)', PB 462
82X,F8.6,8X,3(F9.6,9X),F9.6/ PB 463
93X,'WET BARK('F3.2,'11 RATIO OF RDWD) ',F8.6,8X,3(F9.6,9X),F9.6/ PB 464
93X,'SCREENED WET WOOD RESIDUES',4X,F8.6,8X,3(F9.6,9X),F9.6/ PB 465
17X,'TOTAL FUEL GENERATED',6X,F8.6,8X,3(F9.6,9X),F9.6// PB 466
2' AUXILIARY FUEL BTU ',12X,F8.6,8X,3(F9.6,9X),F9.6// PB 467
3' NET FUEL REQUIREMENT',12X,F8.6,8X,3(F9.6,9X),F9.6// PB 468
570 FORMAT(' FUEL REQUIREMENTS'/3X,'DRYER HEAT'/3X,'('F8.6,'BTUS/LB.WPB 469
1ATER EVAP.),'1X,F8.6,8X,F9.6,9X,F9.6/3X,'PROCESS STEAM'/ PB 470
27X,'PRESS',21X,F8.6,8X,F9.6,9X,F9.6/ PB 471
37X,'THAW POND',17X,F8.6,8X,F9.6,9X,F9.6/ PB 472
47X,'HEATING',19X,F8.6,8X,F9.6,9X,F9.6/ PB 473
57X,'MISCELLANEOUS',13X,F8.6,8X,F9.6,9X,F9.6/ PB 474
610X,'TOTAL FUEL REQUIRED',4X,F8.6,8X,F9.6,9X,F9.6// PB 475
7' WOOD FUEL GENERATED'/3X,'DRY FINES/TRIMS('F4.1,'X','F4.1,'X)', PB 476
82X,F8.6,8X,F9.6,9X,F9.6/ PB 477

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93X,'WET BARK('F3,2,'1 RATIO OF WOOD)' ,F8,6,8X,F9,6,9X,F9,6/ PB 478
93X,'SCREENED WET WOOD RESIDUES',4X,F8,6,8X,F9,6,9X,F9,6/ PB 479
17X,'TOTAL FUEL GENERATED',6X,F8,6,8X,F9,6,9X,F9,6// PB 480
2' AUXILIARY FUEL BTU ',12X,F8,6,8X,F9,6,9X,F9,6// PB 481
3' NET FUEL REQUIREMENT',12X,F8,6,8X,F9,6,9X,F9,6// PB 482
WRITE(6,580) PB 483
580 FORMAT(' FUEL AND POWER REQUIRED',6X,'REQ./CU.FT.') PB 484
IF(IOP1.EQ. 0) WRITE(6,390) PB 485
IF(IOP1.EQ. 1) WRITE(6,400) PB 486
IF(IOP1.EQ. 2) WRITE(6,410) PB 487
IF(IOP1.EQ. 3) WRITE(6,420) PB 488
IF(IOP1.EQ. 4) WRITE(6,430) PB 489
IF(IOP2.EQ. 0) WRITE(6,150) PB 490
IF(IOP2.EQ. 1) WRITE(6,160) PB 491
IF(IOP2.EQ. 2) WRITE(6,170) PB 492
IF(IOP2.EQ. 3) WRITE(6,180) PB 493
IF(IOP2.EQ. 4) WRITE(6,440) PB 494
IF(NOPT.EQ. 0) WRITE(6,450) PB 495
IF(NOPT.EQ. 0) WRITE(6,590) CKWH,(V(I,34),I=1,5) PB 496
IF(NOPT.EQ. 3) WRITE(6,600) CKWH,(V(I,34),I=1,3) PB 497
590 FORMAT('CKWH. ELECT. POWER ($',F4,3,'/KWH)',3X,F8,4,8X,3(F9,3,9X),PB 498
1F9,3/) PB 499
600 FORMAT('CKWH. ELECT. POWER ($',F4,3,'/KWH)',3X,F8,4,8X,F9,3,9X,F9,PB 500
13/) PB 501
IF(NOPT.EQ. 0 .AND. IFOP.EQ. 0) WRITE(6,610)POIL,(V(I,33),I=1,5)PB 502
IF(NOPT.EQ. 0 .AND. IFOP.EQ. 1) WRITE(6,620)PCOL,(V(I,33),I=1,5)PB 503
IF(NOPT.EQ. 0 .AND. IFOP.EQ. 2) WRITE(6,630)PGAS,(V(I,33),I=1,5)PB 504
IF(NOPT.EQ. 0 .AND. IFOP.EQ. 3) WRITE(6,640)PHOD,(V(I,33),I=1,5)PB 505
IF(NOPT.EQ. 3 .AND. IFOP.EQ. 0) WRITE(6,650)POIL,(V(I,33),I=1,3)PB 506
IF(NOPT.EQ. 3 .AND. IFOP.EQ. 1) WRITE(6,660)PCOL,(V(I,33),I=1,3)PB 507
IF(NOPT.EQ. 3 .AND. IFOP.EQ. 2) WRITE(6,670)PGAS,(V(I,33),I=1,3)PB 508
IF(NOPT.EQ. 3 .AND. IFOP.EQ. 3) WRITE(6,680)PHOD,(V(I,33),I=1,3)PB 509
IF(NOPT.EQ. 0 .AND. NAXF.EQ. 1) WRITE(6,690)POIL,(V(I,35),I=1,5)PB 510
IF(NOPT.EQ. 0 .AND. NAXF.EQ. 3) WRITE(6,691)PGAS,(V(I,35),I=1,5)PB 511
610 FORMAT(' HBL. OIL ($',F6,2,'/BBL.)',9X,F8,6,8X,3(F9,6,9X),F9,6) PB 512
620 FORMAT(' TONS COAL ($',F6,2,'/TON)',9X,F8,6,8X,3(F9,6,9X),F9,6) PB 513
630 FORMAT(' MCF. GAS ($',F6,2,'/MCF.)',9X,F8,6,8X,3(F9,6,9X),F9,6) PB 514
640 FORMAT(' TONS WOOD ($',F6,2,'/TON)',9X,F8,6,8X,3(F9,6,9X),F9,6) PB 515
650 FORMAT(' HBL. OIL ($',F6,2,'/BBL.)',9X,F8,6,8X,F9,6,9X,F9,6) PB 516
660 FORMAT(' TONS COAL ($',F6,2,'/TON)',9X,F8,6,8X,F9,6,9X,F9,6) PB 517
670 FORMAT(' MCF. GAS ($',F6,2,'/MCF.)',9X,F8,6,8X,F9,6,9X,F9,6) PB 518
680 FORMAT(' TONS WOOD ($',F6,2,'/TON)',9X,F8,6,8X,F9,6,9X,F9,6) PB 519
IF(NOPT.EQ. 3 .AND. NAXF.EQ. 1) WRITE(6,700)POIL,(V(I,35),I=1,3)PB 520
IF(NOPT.EQ. 3 .AND. NAXF.EQ. 3) WRITE(6,701)PGAS,(V(I,35),I=1,3)PB 521
690 FORMAT(' HBL. AUX. OIL ($',F5,2,'/BBL.)',5X,F8,6,8X,3(F9,6,9X),F9,PB 522
16) PB 523
691 FORMAT(' MCF. AUX. GAS ($',F5,2,'/MCF.)',5X,F8,6,8X,3(F9,6,9X),F9,PB 524
16) PB 525
700 FORMAT(' HBL. AUX. OIL ($',F5,2,'/BBL.)',5X,F8,6,8X,F9,6,9X,F9,6) PB 526
701 FORMAT(' MCF. AUX. GAS ($',F5,2,'/MCF.)',5X,F8,6,8X,F9,6,9X,F9,6) PB 527
999 CONTINUE PB 528
999 CONTINUE PB 529
WRITE(6,1000) PB 530
1000 FORMAT('1') PB 531
SUBROUTINE SUMI(HMTV,DMCT,RTUE) SUB1 1
C *** SUB1 2
C *** THIS SUBROUTINE CALCULATES THE EFFECTIVE HEATING VALUE OF SUB1 3
C *** WOOD TYPE FUELS AT A GIVEN MOISTURE CONTENT ASSUMING A FLUE GAS SUB1 4
C *** TEMPERATURE OF 400 DEGREES FAHRENHEIT, 40% EXCESS AIR SUB1 5
C *** SUB1 6
PCTR=0.40 SUB1 7
T1=68.0 SUB1 8
T2=400.0 SUB1 9
C *** GREEN HASIS MOISTURE CONT.(OR LBS. WATER/LB. FUEL) SUB1 10
GMCT=DMCT/(1.0+DMCT) SUB1 11
C *** WEIGHT OF WOOD PER LB. OF GREEN OR WET WOOD FUEL SUB1 12
WTWO=1.0-GMCT SUB1 13
C *** HEAT LOSS PERCENT DUE TO MOISTURE (CALLED SENSIBLE HEAT LOSS,SHL) SUB1 14
HMTV=HMTV*10.0**6 SUB1 15
SHL=(GMCT*(1090.7-T1+(0.455*T2)))/((1.0-GMCT)*HMTV) SUB1 16
C *** HYDROGEN HEAT LOSS PERCENT SUB1 17
HHL=0.54*(1090.7-T1+(0.455*T2))/HMTV SUB1 18
C *** DRY GAS HEAT LOSS PERCENT SUB1 19
DHL=((T2-T1)*(1.429*(PCTR)+1.52))/HMTV SUB1 20
C *** OTHER (MISCELLANEOUS) HEAT LOSS PERCENT = 5 PERCENT SUB1 21
C *** TOTAL HEAT LOSS PERCENT SUB1 22
THL=SHL+HHL+DHL+0.05 SUB1 23
C *** EFFICIENCY PERCENT SUB1 24
EFF=1.00-THL SUB1 25
IF(EFF.LT. 0.0) EFF=0.0 SUB1 26

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C *** FURNACE BLACKOUT OCCURS AT GREEN M.C. GREATER THAN 68 PERCENT	SUB1	27
IF(GMCT .GT. 0.68) EFF=0.0	SUB1	28
C *** AVAILABLE HEAT PER POUND	SUB1	29
AVH=THD*HMTV	SUB1	30
C *** EFFECTIVE HTU'S PER POUND	SUB1	31
HTUE=AVH*EFF	SUB1	32
IF(HTUE .LT. 0.0) HTUE=0.0	SUB1	33
C *** MILLION EFFECTIVE BTU'S PER POUND OF FUEL	SUB1	34
BTUE=HTUE/10.0**6.0	SUB1	35
HMTV=HMTV/10.0**6.0	SUB1	36
RETURN	SUB1	37
SUBROUTINE SUB2(RTFU,HTEF,IFOP)	SUB	1
C *** THIS SUBROUTINE CALCULATES THE EFFECTIVE HEATING VALUE OF THE	SUB	2
C *** VARIOUS FUELS ON THE BASIS OF A SIMPLE PERCENT EFFICIENCY LOSS	SUB	3
IF(IFOP .EQ. 0) HTEF=0.80*RTFU	SUB	4
IF(IFOP .EQ. 1) HTEF=0.86*RTFU	SUB	5
IF(IFOP .EQ. 2) HTEF=0.87*RTFU	SUB	6
IF(IFOP .EQ. 3) HTEF=0.65*RTFU	SUB	7
RETURN	SUB	8
END	PR	532

U.S. Forest Products Laboratory.

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